JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

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VOL. LXXX., No. 2055.—TUESDAY, SEPTEMBER 30, 1902.

EDITORIAL NOTES.

Question of Over-Capitalization.

THERE was recently published in "The Times" an article by an American railway official, who began his career in this country, contrasting American and British railway management. That article has caused no little stir in the railway world, and not unnaturally, considering that (endorsed by a leading article in the same issue) it threw serious doubt upon the solvency of British railway companies. The grounds upon which the indictment was founded are of general interest; and gas directors and managers may well be advised to study it with a view to taking heed lest similar accusations could be fairly made against their undertakings. The main count in the indictment is one perfectly familiar to "JOURNAL" readers; for it is one that can, with good show of reason, be brought against other commercial concerns than railway companies. It is that of sacrificing the future to the present—by loading the capital account with every item of expenditure that can by any manner of reasoning be kept out of revenue—in order to pay a rate of dividend that the true position of the business does not warrant, or which anyone having a wise regard for its future would not consider it good policy to distribute.

The correspondent of "The Times" makes out a strong, though doubtless (like most American criticisms of English practice) somewhat high-coloured, case by means of a comparison between the capital and revenue accounts of an old-established, prosperous, and conservatively-managed American railroad, and those of one of the most go-ahead of our English companies. This shows that the English company, with a capital equal to £44,122 per mile, earns £5624 per mile per annum; while the American company, charging lower rates, earns £4855 per mile per annum upon a capital of only £25,000 per mile. This satisfactory result, the American company has achieved through carrying everything possible in the way of improvements to, and extensions of, existing plant and rolling-stock to revenue, instead of charging all that could possibly be deemed expenditure on extensions to capital. Quotations from the company's last report show that it has charged to "operating expenses" such items as improvements to the system for water supply, £20,000; the provision of larger turn-tables, houses, and coal shoots necessitated by the adoption of larger locomotives; the addition of a third main track on the heavy grades to prevent slow, heavy trains from being delayed for the passage of expresses; and the substitution of steel bridges for those too light for the present traffic, £201,451. The management, says the report, feel confident that, as a result of the large expenditures made for new and heavy equipment and for other improved facilities, a steady decrease will be shown in the cost of transportation service per unit of traffic handled; and there is little doubt about it. On the other hand, we have the statement that "it has crystallized into a recognized practice of British "boards of directors to place everything that can be characterized as extraordinary expenditure into the capital "account, as well as a great deal that cannot, even under "the most liberal interpretation, be so classified."

This statement has since been challenged by the General Manager of the North-Eastern Railway—the one whose working was compared with that of the American company—in a long letter to "The Times," in which the shareholder of the present day who has bought at market price is pointed out as an obstacle to long-sighted finance. That gentleman, who has been trotted out on many a platform at a shareholders' meeting, has been too much considered in the past. We cannot admit that the fact that a concern is the property of "a fluctuating body of shareholders" is any excuse for its policy being less far-seeing than would be that of a private firm of merchants engaged in a similar enterprise. The weak spot in Mr. Gibb's reply to the original correspondent of "The Times" is that he does not appear to sufficiently realize the fact that, by keeping down to the lowest possible level the charge for capital in any business, it is possible to reduce the charge made to the public for the services rendered, thereby encouraging trade, assisting home manufacturers in their competition with foreign goods, and ultimately greatly increasing the volume of business done. The virtue of low freights is as little appreciated by a certain class of railway directors as is that of a low price for gas by some gas directors.

Our immediate concern is not, however, with the financial status of our British railways—although the question of railway rates is, as we have intimated above, one of great moment to every trader, and particularly to almost every gas-works in the kingdom—but rather once more to point the moral that regard for the immediate dividend instead of for the ultimate prosperity of any business, is a foolish and wholly profligate policy, bound in the end to land the concern in an almost hopeless dilemma—that of having an abnormally swollen capital account on the one hand, and a business crying for more capital—more expenditure on its development—on the other. This is the sort of policy one looks for, and gets, from "guinea-pig" directorates; but it is, in these days of competition, more than ever fatuous. "Wherefore, let us get rid of the guinea-pigs," is what the shareholders would say—if they were not the most inarticulate, patient, and long-suffering of individuals.

The Honesty of Prepayment Gas Consumers.

A HUMOROUS philosopher once observed that there is a good deal of human nature in man; and it is one of the most striking of the infinite varieties of the manifestation of this nature, that men draw the line between right and wrong, honesty and knavery, in many different places. Gas suppliers have of late years explored what was to them a fresh line of business, in the retailing of gas for small payments in advance; and in so doing they have come upon some very curious vagaries of human nature. Indeed, the whole principle of the sale of goods for payment by instalments is a concession to human nature, such as academic economists must rightly condemn. It is not the way to buy things at the cheapest possible price, which political economy rightly holds to be the main governing consideration in commerce. We have not the time now to look up the references; but, speaking broadly from a recollection of pretty extensive reading in text books, we cannot recall anything favouring the instalment plan of payment, which has nevertheless been instrumental in evoking a vast body of trade. It is patently uneconomical; but it lives by its convenience to both parties. People of limited incomes, received regularly at short intervals, can and do buy things which they are able to pay for in the same way, but would never be able to purchase with a lump sum. On the other hand, the dealers in these goods are well content to find a market for them in this way, which would otherwise be lacking. The possibility of this kind of commerce rests on the condition of the purchasers being people whose small resources compel them to constantly practise the art of living by going without things. They have enough for their bare needs, and some over, but never sufficient to enable them to procure any and everything they would like to possess. They constitute the majority of the civilized population of the earth. One has to go pretty high in the social scale to find people who do not buy anything on the instalment plan—not even a house or a motor car; while only the very poor are so destitute of the smallest superfluity that they cannot buy something on easy terms.

The present point of all this is, that payment by instalments is a very widely recognized and largely patronized system in trade; and as such it is usually honestly carried out. People do not, in point of fact, regard themselves as less bound to pay an instalment than the whole sum of their indebtedness. When the sale of gas by some easy prepayment method—of which several were tried—was begun in this country, the idea that would-be consumers might attempt to "dodge" the payments could not enter into the

question of the expediency of embarking upon this experiment, because there was no opening for it. With the universality of the penny-in-the-slot system of prepayment for gas, however, this element soon declared itself. It is not our intention to take a part in the correspondence on the subject of the extraction of gas from these meters by other means than the proper introduction of current coin of the realm, but merely to remark upon the very noteworthy working of human nature of which such futile frauds, when they are frauds, are the outcome. It cannot be questioned, for the fact is of general notoriety, that what is called common honesty is very rare indeed, if it is regarded as incumbent on everybody, always, in respect to every transaction. The prepayment meter goes down to a stratum of the populace which thinks it no sin to "do" a company or a public institution of any kind. The feudal sentiment of the governing class, with its distinction between "debts "of honour" and others, is of a piece with this kind of moral astigmatism. Sending in false income-tax returns, smuggling, and an occasional bit of poaching, are often not regarded as blameworthy among a class which would rather die than cheat at cards. Lower down, we encounter the people who experience no compunction in swindling a railway company; and so on down through the whole gamut of conventional morality. We are apt to pride ourselves as a nation on being less given to petty knavery than some others. English people are, as a rule, superior to the small chicanery of giving wrong change, and the pilfering of halfpence, which is not unknown in some other countries; but, apparently, gas companies are on the game list of a certain class of sportsmen, who cannot resist the temptation to "try it on," though a moment's reflection would convince them that discovery is certain. It appears to be a vulgar variety of kleptomania, albeit usually distinguished by a shorter name.

The Relation of Temperature to Gas-Fires.

Procrastination is one of the mischievous traits of human nature which, it is safe to say, will never be altogether eradicated; but it is a trait upon which impression can be made (sorrowful moments of youth will occur to most of us) by persuasive methods of various kinds. Procrastination as a cause of an ill-effect upon two points of supply in the gas industry—the supply of gas-fires and the supply of the fuel for use in them—and a suggestion of a means of attacking that cause together form the theme of an article to which Mr. E. W. T. Richmond had set his hand, and which he was proposing to communicate to the gas profession, when, with deplorable swiftness and at the very height of his activity, he was removed from our midst. Under the painful circumstances, the article will be perused with an interest quite distinct from that which the subject-matter itself would alone have aroused had the author still been with us. Mr. Richmond submitted the article to us "cast in the rough" for acceptance before the finishing touches were put to it; and it was left in our hands in its incomplete state. However, it was not a difficult task to shape it according to the scheme; and it has been, and is, a pleasure to be able to conform to his intentions in regard to it.

Everyone who knows anything of the character of one branch of the business which the author of the article did so much to develop, and which brought him, if not personally, through his many representatives directly into touch with gas consumers, must admit that he had special opportunities for judging of the reasons why householders do not adopt gas-fires with the same alacrity that they do (say) cooking-stoves and slot meters; and we have it as his deliberate view, founded on several years' experience, that procrastination—the putting off from time to time because the gas-fire is not an immediate necessity, or because it may not be required for long—is, in the main, responsible for the (comparatively to what he believed it should be all things in favour of gas-fires taken into consideration) light trade that is done in these articles of domestic and business comfort. Other reasons which it was not his business to enter into, nor in this reference to the article is it ours, will occur to most readers. But if Mr. Richmond is correct that procrastination and *sang froid* on the part of consumers under agreeable climatic conditions are the operative causes against a well-sustained business in gas-fires in the winter, then these are impediments of an assailable nature.

We believe in large measure the author's view is right; and it is a further tribute to one of his distinguishing qualities to say that he does not leave us with a mere diagnosis and opinion without a remedial prescription. He finds, in his experience, that the largest amount of business in gas-fires is done in the warmer months of the winter; and he advises that gas suppliers should, for the development of this class of business, use as a lever the fact that the colder months of the winter come after Christmas. For this purpose, he has given, and has gone to some expense in obtaining from the Meteorological Office, the average temperatures during the six months from October to March—calculated from the observations of thirty years. These prove beyond dispute the fact that the longest and severest period of cold is experienced in the early months of the year, when there is the least business in the placing of gas-fires. The larger business that is done in the warmer months of the winter he frankly ascribes to the prevision of gas consumers. But there is reason in his opinion that the succession of colder months should maintain something like an equilibrium in output, at all events in January and February. As he says, the temperature statistics that he supplies cannot be known to all consumers; and if use can be made of them, in a persuasive way, to produce something like an equality in output then his last personal service to the gas industry will not have been lost. He was always looking beneath the surface of things of problematical character to ascertain, so far as human intelligence could ascertain, the why and the wherefore of their existence, and to use what he discerned for the benefit of his own business. But to the extent that his personal ability had influence in doing this, to that extent he served well the gas-supplying industry. This article may be taken as his last message on a subject which was almost the constant thought of his wakeful and vigilant hours; and regarding it thus, and thinking of the virile quality of the author, the parting prayer will not be out of place here: "*Sit tibi terra levis*."

Quality of the British Association Proceedings: Sir F. Bramwell on a Universal Language.

Things in the world of science are usually a little flat after a British Association meeting, and this year is no exception to the rule. The Belfast meeting of the Association is over, and for some weeks the scientific and technical periodicals will contain little besides reprints of the addresses and papers. It is more than slightly irritating to encounter this hackneyed matter again and again in weekly, and, finally, in monthly publications, long after one has gleaned the sense of it from the newspapers. Hash, as the American philosopher testified, is good in moderation; but hash rehashed too many times over grows wearisome at last. And most of the pabulum served up to British Association audiences is hash. It can scarcely be anything else, if it is to gratify the public demand for information as to what science has to show as the year's gains. Curiously enough, there are complaints this year both that the British Association has become too scientific, and is not scientific enough. People have written to the newspapers to say that, whereas they have hitherto looked forward to the reports of the British Association proceedings as offering the means of keeping themselves posted generally in regard to the aims and progress of contemporary science, this year most of the addresses and papers deal with technicalities, and in language obscure to the ordinary reader. On the other hand, certain newspapers have protested warmly against the admission to the programme of the meeting of much that can scarcely, by the widest stretch of complaisance, be described as scientific matter. It might be said that such a conflict of complaints shows that the programme was not far out of the way; but it is also open to a very severe critic of the Association to admit that all these grumbles were well founded, seeing that the proceedings were throughout of mediocre interest. When science happens to be "marking "time," as it is just now, scientific men must either talk technicalities, or twaddle. They might hold their tongues, of course; but then they would abstain from meeting.

For lack of other provocative material, some of the newspapers have fallen foul of Sir Frederick Bramwell, for his suggestion that science and industry ought to have a language common to every people, and that Italian might be this language. "Mighty ingenious," say the critics, "but "where does the science come into this proposal, that it should "be admitted to the British Association programme?"

It is at least as scientific a matter as that hardy annual, the compulsory adoption of the metric system of weights and measures for the United Kingdom. Sir Frederick Bramwell is old enough to remember the period when "Italian" was a fashionable accomplishment, taught in most English "finishing academies." One can quite understand how hateful to him must be the idea at present fashionable in scientific circles, that knowledge of German is essential to an Englishman's education. The fact of the day undoubtedly is, that discoveries in science and technical records are published in one of the three leading languages of progressive civilization—English, French, and German. This is for the time being a great nuisance; for while English is making headway, and must eventually become the world-language of civilized man, it needs a trilinguist to cope with the actual situation. Every English person of ordinary intelligence and aptitude for learning can acquire an adequate literary knowledge of French; but it is not so with German. Why Sir Frederick Bramwell, who is so doughty an opponent of the metric system of weights and measures, should go out of his way to exalt Italian into the artificial position of a universal tongue is a puzzle. What is the matter with English, as an American would ask, in this connection?

The point of selection will settle itself in due time; and we sincerely hope Sir Frederick Bramwell may live to see the day. But his favourite language, beautiful as it is, will not be the chosen tongue of the work-a-day world. Italian has much to recommend it; but it exhibits one fault, which is fatal—it is long-winded. It is polysyllabic, although not agglomerative like German. The world will not have time to spell and speak out such words as *illuminazione*—seven distinct syllables—for "lighting." But this is not to say that the English language will be worthy to possess the labouring earth, unless the leading men of those whose native tongue it is, exercise every possible solicitude for its teaching and preservation in lucidity and precision. Sir Frederick Bramwell will do well to drop his flirtation with Italian, and lend the power of his wit and good sense to the help of those who are struggling, on the platform and in the Press, against the torrent of slipshod composition and of blundering wording which threatens to reduce the language of Shakespeare and the Authorized Version of the Bible to a formless gibberish.

Trade Unionism Again Unmasks Itself.

THERE is an ingenuousness about the common type of "Labour" politician which is not a little engaging. No sooner does the artful Fabian, or the politic wire-puller of municipal experience, succeed in throwing a little dust in the public eye, so as to obscure perception of what "organized labour" really wants, than some disciple of theirs in the lower ranks of Trade Unionism is sure to give the show away. It was so last week—a sufficient interval having elapsed after the close of the Trade Union Congress, whereat official Socialism was on its best behaviour. The more ardent spirits in the movement must have chafed under the meekness of Mr. Steadman's demeanour. He carefully refrained from gibbeting the typical Trade Unionist as the man who wants to have his own way in everything, and be paid his own price for it. Nor did he claim for Trade Unionists that superiority to the law of the land which they fondly imagined they possessed, until Mr. Justice Farwell told them something to the contrary. But Mr. Steadman was a Member of Parliament of some years' standing, and has learnt that there are more classes and interests than one in the great world. In the course of last week, however, the true voice of Social Democracy made itself heard in his despite; and its message is worth repeating in the ears of such as may have flattered themselves that Trade Unionism has changed its nature. There was a meeting of the Social Democratic Federation which was to have been presided over by Mr. Will Thorne, of the Gas-Workers' Union, only he had some other engagement. The gathering was addressed by several Trade Unionists, who admitted that the Courts have broken the power of the Unions, and called for the recognition by "the workers" of the "class war—the antagonism of interest between the "workers and their masters." One speaker said, amid applause, that "they would never gain anything unless they "recognized class war." The sentiment seemed to be greatly approved by the assembly.

It is just as well to have these little casual reminders of the unchanging, hopeless nature of the enmity which Social Democratic Trade Unionists bear to the employers who find working men their wages. One almost wonders that such noble, independent souls ever hold out their hands for money at all; but perhaps they salve their consciences by doing as little work as they can manage for as much money as they can extort. In dealings with an enemy, anything of this sort is probably regarded as fair. The record will stand, however, for a memorial of the disaffection which is the real spirit of Trade Unionism, by whatever name it is called. By all means let the Social Democrats drop their disguise as Trade Unionists, and permit themselves to be known for what they are—bitter foes to their own bread and butter. Talk of conciliation in their regard is idle words. They do not mean to pretend to have any common interest with employers in the prosperity of the industry in which they are both engaged. Directly a "worker" starts on his own account and employs a man to help him, he goes over to the enemy. Conversely, it is difficult to understand how a "worker" with a spare shilling to his credit can be a Social Democrat. Nay, how can a rigid person of this persuasion ever accept the smallest paid service from another—as a pint of beer (say) from a potman—without encouraging the "master," and thereby foregoing his antagonism to the institution? The line of demarcation between masterhood and workership, or however the parts may be described in the play-bill of life, has never yet been plainly drawn from the top to the bottom of the social scale; and until this is done, the idea of "recognizing class war" seems more than a little fantastic.

Commercial Gas Company's Affairs.

THE Directors' report and the statement of accounts of the Commercial Gas Company for the last half-year's working have been issued; and the ordinary general meeting of the Company will be held on Thursday, which will be the last of the meetings under the old Act, as the new measure comes into force with the beginning of the New Year. The report states that the net profit for the half year amounts to £57,133, to which is added the balance of £248 brought forward from the previous half year; making a total revenue balance of £57,382. After the interest payable is deducted, the balance available for dividend amounts to £50,866, out of which the Directors recommend the payment of dividends after the rates of 12½ per cent. per annum upon the old stock, and of 9½ per cent. per annum upon the new stock. The report proceeds to record the passing of the Company's new Act, and to explain its provisions in respect of the conversion of stocks. As compared with the accounts for the corresponding period of last year, there is a considerable improvement; the net profit then shown having been £44,651, and the amount of the balance available for dividend £37,754. The dividends were also 12 and 9 per cent. The quantity of gas accounted for shows an increase of over 3 per cent. The cost of gas manufacture has fallen from £178,635 to £141,862; while the revenue from gas stands at £182,290, as compared with £197,239 at the prices then ruling. The revenue account exhibits some really suggestive new entries, on which the Chairman, Mr. W. G. Bradshaw, may be expected to have something interesting to say. Profit-sharing appears for the first time, for £3211. So likewise does incandescent mantle maintenance, for £478. Although the number of public lights has dropped from 5250 to 4850, thanks to the forced increase of municipal electric lighting, the cost of attending to them is slightly higher, which probably relates to the introduction of the incandescent system. The automatic meter business continues to expand in the district. Residuals, of course, are less profitable. A considerable economy of carburetting oil appears to have been effected. The other figures of the accounts do not call for particular notice here; their general tenour being as satisfactory as usual.

Gas Companies' Protection Against Electrical Companies.

IT is to be hoped that the proprietors of gas undertakings in the United Kingdom, and especially those who are responsible for the safe custody of this class of property, are thoroughly awake to the necessity of keeping abreast of the

times as regards statutory protection. The season has arrived when the completing touches must be given to the drafts of Bills for the ensuing session; and Parliamentary Agents are not likely to overlook anything that their clients need. But Agents only act after promoters have decided to apply to Parliament; and what we particularly desire to emphasize here, for the benefit of those whom it may concern, is the important difference made in the circumstances of English Gas Companies by the growing mass of electric light and power legislation. Many Gas Acts are rendered quite out of date by recent Electricity Acts; and the Gas Companies will be well advised to consider how they can recover any ground that may have been lost in this respect. According to a statement of a contemporary, the fact of a Gas Company carrying on business without the authority of Parliament "appears to be sufficient to deprive them of the "right which they would have to oppose a rival concern if "they were working under Provisional Order or Special Act." The support for this opinion is the experience of a non-statutory Gas Company in Scotland, who tried to oppose the Caledonian Electric Power Bill, 1901, in Committee. The Gas Company failed to get their *locus standi* in this case. The precedent obviously proves that non-statutory Gas Companies are running a greater risk than ever, in dispensing with statutory protection. There is so little ground for continuing to carry on a gas undertaking in this way, that the proprietors of such concerns can only need to have their attention called to the state of affairs, to consent to the necessary steps to alter it being taken without a moment's delay. It is different now from the condition of things a few years ago, when perhaps Gas Companies could feel that they had nothing to fear from Local Authorities. Electric enterprise knows no bounds and respects no traditions. It would be a sad awakening of many gas proprietors to be told by a rival concern that they had no special rights which new comers into the district need respect; but this is to be expected by Gas Companies who are not forearmed. They cannot even plead that they have not been forewarned.

A View of Birmingham Municipalism.

THE articles on Municipal Socialism in the "Times" have gone the length of an impeachment of Birmingham, which is not merely carrying the war into the enemy's country, but into his very sanctuary. The origin and history of the Chamberlain *régime*, which marked the blossoming of a new kind of municipal growth, is firmly and not unsympathetically traced. Before those days, Birmingham Corporation politics were of a "pot-house" type; and it is Mr. Chamberlain's chief glory as a Birmingham man that he changed all that. It is more than hinted, however, that the higher level upon which Mr. Chamberlain placed Birmingham Corporation affairs has not been preserved. The policy of municipalizing the gas supply and applying profits in aid of the rates is criticized; and it is very fairly conceded that Birmingham offers evidence on both sides of the argument. It is worthy of repetition, although the fact is pretty well known, that it was the present Town Clerk of Birmingham, Mr. Smith, who had the boldness to declare that the question of the expediency of taking away the municipal franchise from Corporation employees and the occupiers of municipal tenements would have to be faced. He admitted that, so far, the Corporation had not experienced any disadvantage from having a number of Corporation workmen who are also municipal voters; but this was probably the very reason why he was able to sound the alarm. A declaration of this kind could not be kept back until the danger had actually declared itself on the spot, when it would probably never have been heard at all. In other places, however, the matter has become pressing, and must soon attract remark.

The Proposed Crystal Palace Exhibition.

In view of correspondence which the short article in last week's "JOURNAL" on this subject has evoked, no apology is needed for a further reference this week. It is gratifying to be able to say that the letters received are entirely in accord with the attitude taken up against exhibitions of showy pretensions, but which in the result only serve to demean in the eyes of the public a great industry by its partial representation, through the absence of the first requisite of proper initiative and auspices. The remarks made last week in the notice of the proposed exhibition are mild in comparison with some of the criticisms contained in the letters addressed to us; but it is unnecessary to give the latter full publication. Two or three quotations, however, may be made to show that we properly interpreted the feeling of the gas industry against having another privately organized exhibition set up in its name. "It is a matter of regret," says one correspondent, "that the exhibition is not to be carried out by the Gas Institute or some other body recognized by the trade, and in whom they have confidence." And, furthermore, a writer says: "It is a pity that such a vast and important industry should be so frequently exploited for the sake of what financial gain may be made by individuals out of it, irrespective of, and detrimental to, any advantage that might possibly" (under other circumstances) "accrue to the exhibitors or to others interested in the gas industry." In another letter, information is given concerning past exhibitions, culled from printed matter and correspondence; and "the originals," says the writer, "are at your service for inspection or copying." The information is interesting and useful for guidance; but, so far as we are concerned, nothing more. A large firm write that they will not be "doing anything" at the exhibition, for a reason which it is preferable should be withheld. Now, without going beyond this, we put it to the "Organizing Commissioner," Will it not be better than to court disaster to drop the gas section of the proposed exhibition before further expense is incurred by him in what we believe, from our own knowledge, will be a vain effort to secure something worthy of the gas industry and of his own exertions? To put it plainly, the industry was not at all satisfied with last year's show, which was only good to the extent that it went; and there is a disposition not to support another exhibition until it is backed by adequate authority. So far as the smoke abatement section is concerned, that is no business of ours. It is receiving the support of the Coal Smoke Abatement Society.

"Unaccounted-for."

If Mr. Harrison Veevers had set himself the task of preparing a paper for presentation to one of our technical societies on accounted-for gas, he could hardly, within reasonable measure, have dealt with his subject in a more thorough or transparent manner than he has done in the report which he has presented to his Committee, and which we reproduce elsewhere. The question is one of perennial interest to the gas engineer, for the gas which he regretfully enters in his returns as "unaccounted-for," and however small the percentage does not like to see, is, more frequently than not, a loss in his working which mocks his most watchful care and all gallant attempts (excepting perhaps when there is a violent rush upward, which can he traced to some special circumstance) to bring it to any pronounced extent below the previous recorded average. It is, in fact, almost as much as he can manage to keep a fairly level average year by year, even in districts that suffer but little by abnormal disturbance. Mr. Veevers is in charge of an area that is greatly affected by subterranean workings; and there one naturally expects to find the unaccounted-for item higher than in localities where the industries are carried on above ground, or that are purely residential. But when it was found that, taking 1897 as the starting-point with a percentage of unaccounted-for gas of 7·68, the item had gradually moved up to 16·05 in the year ending with March last, and that in the succeeding June quarter the figure was 22·47 per cent. as against 18·18 per cent. in the corresponding quarter, it is not in the least surprising that it "excited alarm, and a strong desire to have a thorough investigation of the causes, and of the remedies to be applied." Mr. Veevers' report gives the result of his investigations; but, thorough as he has been in his examination, he must confess to slight reward in his quest for specific causes to explain the rise. If we take the last paragraph but one of the report, he is only able to definitely account for about 1 per cent., which still leaves on the quarter an increase of 3 per cent. There was an increase of about 5¼ per cent. in the year ending March, 1902, as compared with 1901, due "no doubt," as Mr. Veevers says, to sewerage operations and shallow coal workings; but he does not emphasize these as causes contributing to the rise in the June quarter, though there can be little question they helped to do so.

General Lessons.

But, even if the local troubles are ignored, the report will be interesting to all professional readers (especially those in mining

districts) for the lessons it teaches. There can be no question that the bulk of leakage is due to defects in pipes—whether cast iron, wrought iron, or lead; but the most important waste occurs in the service-pipes, particularly where connected to the mains, and in the corrosion of the wrought-iron service-pipes between the main and the meters. In 1884, Mr. Veevers introduced lead pipe for services; and the gas unaccounted-for was gradually diminished from 20·8 per cent. in 1886 to 7·68 per cent. in 1897. He lays great stress on the effectiveness of this change in assisting in the lowering of the leakage account. Serious escapes, too, have been found to be due to the leaving in the ground of disused wrought-iron service-pipes, which have corroded in time. Such pipes, he advises, should be disjointed at the main and the hole plugged up. The influence on the percentage of unaccounted-for gas of an insufficient estimation of the amount that the public lamps consume, and waste from the excessive size of bye-pass lights are points that he advances, and which should not be neglected. But Mr. Veevers does not regard the loss owing to the difference of temperature of the gas at the station meters and the consumers' meters as worthy of particular notice, as his tests satisfy him that there is not much difference; but he considers systematic attention to consumers' meters a question of vital importance. Loss due to alterations in the dates of reading the consumers' meter indices does not apply in Dukinfield, as care is taken to have them read on the day corresponding to that on which they were taken the previous year. These are of the many points of general interest which will be found in the report mingled with matters of purely local importance, and which justify its publication *in extenso*. But a sentence more on its local side. If Mr. Veevers is given a free hand in overhauling the distribution system, there can be no two opinions regarding the realization of a more satisfactory state of affairs in connection with the unaccounted for gas.

Street Lighting by Electricity.

In the Board of Trade returns of authorized electricity supply undertakings in the United Kingdom for the year 1900, which have just been issued (see p. 868), one fact comes to light of so extraordinary a character that it is impossible to pass it over without comment. The names of 63 companies are included, having a total capital expenditure of £10,954,188; and between them they only received for public lighting during the year to which the returns refer the paltry sum of £30,235. On the other hand, 165 local authorities are named, having a total capital expenditure of £14,943,122; and the amount received by them for public lighting reaches the very large total of £194,427. From these figures, it will be seen that, except where municipalities own the electricity undertaking, public lighting by this means is almost a negligible quantity; and it will also be understood what a very important part this same public lighting plays in swelling the receipts of the electricity works belonging to local authorities. Who after this shall contend that electricity is used for public purposes simply because it is the best light? If that had been the sole reason for its adoption, the companies would surely have received a larger share of it than has up to the present fallen to their lot. This being so, it is necessary to seek for another explanation; and readers of the "JOURNAL" will not have to look far before they find one which will be quite good enough to satisfy them. A big public lighting installation forms an excellent backbone to the business of a municipal electricity undertaking; and, of course, the heavy extra cost which the ratepayers have to bear for this luxury comes out as "profit," or as often as not (if not more often) assists in reducing the loss which would otherwise appear on the balance-sheet. So long as the ratepayers understand clearly how these "profits" are arrived at, and do not complain, there is no more to be said. But would they not be at least equally as well off if they kept in their pockets the extra money needed to light the streets in this costly manner, and made up their minds to forego these illusory "profits" on the municipal electric light undertaking? Worcester may be cited as a case in point. There the city spent about £200 a year less on gas for public lighting than they did in 1893; but an altogether new expenditure has arisen on electricity, amounting to £1583 per annum. The electric light undertaking at Worcester is in the hands of the Corporation.

Some Good Advice.

An announcement which appeared in the South Wales newspapers last week is of so happy a character as to almost make one believe that the millenium must be near at hand. It is so frequently our unpleasant duty to have to record squabbles and the existence of ill-feeling generally, on the part of municipalities towards gas companies, that it is a real pleasure to come across anything likely to improve this state of affairs. It appears that a Sub-Committee of the Swansea Corporation recently waited upon the Gas Company with reference to their decision (since withdrawn) to increase the price of street lighting, and that they have now presented a report to the Streets Committee suggesting that "it would be advantageous to both the Corporation and the Company if an occasional meeting were held for the discussion of matters of common interest." Here is a recommendation, very simple, but full of good, sound sense. That such meetings as are here proposed would be of mutual benefit cannot be denied; and yet how is it that we do not more often come across similar suggestions? Perhaps it has never occurred to some local authorities that it might be possible for them to live on terms of friendship with the companies who are responsible for the supply of gas in their districts—at least, if it has, there seems a decided objection to make a trial in that direction. For the benefit of such authorities, we desire to give all possible publicity to the Swansea Sub-Committee's recommendation; and if any proof of the soundness of their advice should be needed, we would point to the statement of the Committee, that "in the present instance the conference has resulted in a saving of hundreds of pounds annually to the Corporation which the Gas Company could have claimed, and which the Corporation could not have resisted." Another reason for the existence of a friendly feeling between the parties is contained in the statement that while the Corporation pay £5561 for gas and maintenance, the Company pay the Corporation for water, land, and rates £3000 a year. The Sub-Committee's report will come before the Corporation in due course, when no doubt it will be received in the spirit which it deserves. Meanwhile, we would earnestly commend the proposal to the consideration of the many authorities who might benefit by the adoption of a similar attitude to that taken up at Swansea.

Contentment at Shrewsbury.

The Shrewsbury Gas Company have been in existence for 82 years, and the business is still as vigorous as ever—indeed, its vigour appears to increase with age, for at last week's meeting the Chairman (Mr. J. Spencer Phillips) said the report then presented was without exaggeration the best one they had ever had. And this is a Company engaged in an industry which some people think, or pretend to think, has seen its best days, and is now on the down-grade! That the proprietors of the Shrewsbury Gas Company have every cause to be satisfied with the condition of the undertaking, is manifest from the extended report of the Chairman's very able speech which appears in another part of to-day's issue. Good management is everywhere apparent; and the Board, as well as the Manager, Mr. William Belton, are to be congratulated upon the go-ahead policy that is being pursued. Reliable records of the Company's business only extend back as far as 1863, when the make of gas was 34 million cubic feet; whereas during the past year the output had increased to 172 million feet. That is to say, the consumption is now more than five times as much as it was 39 years ago. The result of this tremendous growth in the business is that the Company have reached the end of their tether; and they are therefore about to make a 50 per cent. addition to their plant. This should carry them on for some time; but if the consumption continues to increase in the future as it has done in the past, the new works will soon be well occupied.

Local Taxation.

Referring in the course of his speech to the question of local taxation, the Chairman said that in his opinion this was one of the most serious problems of the present day; though he added that the tendency of Shrewsbury towards a steady increase in this direction was perhaps less than in some other towns. The enormous increase which is taking place in the indebtedness of local governing bodies all over the country, of course, makes

itself chiefly felt by the large commercial undertakings; but the time cannot be far off when the individual ratepayer will find himself hardly able to bear the burden imposed upon him. In connection with the controversy which is now going on in Birmingham over the proposed Omnibus Bill of the Corporation, it has been stated that in 1884 the debt of the City was £7,000,000; whereas in the present year it is no less than £14,000,000. The increase has therefore been at the rate of £1000 per day during the past eighteen years, or more than £40 an hour. This may not be a very serious matter for a progressive city like Birmingham; but there is only too much cause to fear that the same thing is going on in many places less favourably situated. Where this is the case, it is high time that the ratepayers bestirred themselves, and made a serious effort to stem the current of municipal expenditure.

WATER AFFAIRS.

The Rights of Riparian Proprietors.

In the "Journal" for the 26th ult. (p. 548), brief reference was made to an important judgment given by the Supreme Court of Ohio in an action brought by certain riparian proprietors against the City of Canton, to recover damages for alleged injury sustained by the supply of water to the inhabitants in such quantity as to seriously reduce the volume of a stream upon which they depended for the power to drive their machinery. As the matter came before three Courts, in two of which the original plaintiffs were successful, it seemed it would be of interest to acquaint our readers with the reasons which led the Superior Court to reverse both the previous decisions. These will be found fully set forth in the text of the judgment which appears in our "Legal Intelligence." The original plaintiffs had for about fifty years used the water of a certain creek for working their grist-mill; and up till 1887 there was ample for the purpose and for the supply of the city as well. As the latter grew, however, the quantity of water that reached the mill gradually fell off; and eventually work had to be stopped at night. In 1898, the millowners sought to recover damages from the city for diminishing the supply to the mill. The city authorities, in their defence, claimed to be riparian owners, and to be entitled to use the water as they had done; and they contended that the plaintiffs had no greater right to it for running their mill than the city and the inhabitants had to appropriate the waters of the creek above the mill for domestic, commercial, and manufacturing purposes. Upon the trial of the action in the first Court (the Common Pleas), with a Jury, the latter were instructed by the Judge that, as a matter of law, the undiminished flow of a natural private stream was the right of the riparian owners, subject to this limitation—that each owner might, without subjecting himself to any liability to another owner lower down the stream, use whatever water he needed for his own domestic purposes and the watering of stock; but that the city could not be regarded as an owner coming within the scope of this exception. The Jury returned a verdict in favour of the plaintiffs, and judgment was entered against the city. This being affirmed by the Circuit Court, the city filed a petition in error with the view of having it set aside. In this, as remarked just recently, they were successful. It was held that a city stands, in its corporate capacity, as a single proprietor, and entitled, as such, to all the rights, and subject to all the liabilities, of a riparian proprietor on the stream upon which it is situated. It therefore had the right to use the water for the supply of the inhabitants; and it only incurred liability to the parties below if the supply was extended beyond the city limits, employed in unreasonable quantity for power, or sold to outsiders for commercial purposes. On the latter points, however, no charge was requested or given—it appeared to have been overlooked. It was decided that the Court of Common Pleas had erred in its charge to the Jury, and that the Circuit Court was wrong in affirming the judgment of that Court.

The Incandescent Burner in the Church.—We have had applications for a number of copies of Mr. J. H. Troughton's article which appeared in last week's "Journal" on the above subject; and it has in consequence been printed in leaflet form for distribution. Orders (not less than a dozen copies supplied) should be sent to the "Journal" office.

ESSAYS AND REVIEWS.

ELECTRICITY SUPPLY UNDERTAKINGS.

Board of Trade Returns.

The Board of Trade have this year succeeded in improving a little—though not by any means to such an extent as could be wished—upon the time taken on the previous occasion in the compilation of the returns in respect to authorized electricity supply undertakings in the United Kingdom in the hands of Companies and Local Authorities. The returns for 1899 were not issued until the middle of November, 1901; whereas those for 1900 were published last week—and this in spite of the fact that they were not ordered to be made until three weeks later. The figures contained in the returns are, of course, of considerable value for purposes of comparison with those of the previous year; but, as is the case with the returns relating to the gas undertakings, their belated appearance greatly detracts from their usefulness in other respects. However, bearing in mind that the information given does not indicate the present condition of the electric lighting industry, but merely that of nearly two years ago, we will examine a few of the figures, and see how they compare with those for 1899.

Of the two returns just published, those relating to Local Authorities are certainly of by far the greatest interest; and as time goes on this interest promises to increase rather than diminish. How, for instance (when they come to be published) will the figures for the present year compare with those for 1900, which are now under review? Will they form a record of triumphs achieved or of disappointed hopes? This is a matter which it must be left to the future to definitely decide; but recent experience—and perhaps most of all the ominous murmuring coming from Manchester—affords plenty of evidence on which to base an opinion. Even in the present returns, the figures appearing in the column, "Net profit or loss after providing for interest, sinking fund, &c.," are extremely suggestive; the proportion of Local Authorities who have had to own up to a loss on their undertakings being considerably larger than was the case in the previous returns. This is serious; for we have times without number been told that, though for the first year or two municipal electricity might not pay, this was a merely temporary trouble—the deficit being practically bound to gradually disappear in course of time. But in the present state of the public mind, it seems useless to emphasize even such a significant fact as this increasing loss on the most fashionable of all the many branches of municipal trading. Electric lighting is for the time being a craze; the pity is that it is such a very expensive one. As gas suppliers, we can afford to view the multiplication of municipal electric lighting installations without alarm; but as ratepayers, it is impossible for us to take so calm a view of the situation. Therefore we must hope against hope that in the near future saner counsels will prevail among those Local Authorities—more especially the smaller ones, so many of whom have just now got the "fever" badly—who imagine that electricity and profit must of necessity go hand in hand.

To come to the figures, we find that particulars have been supplied by 16 London and 47 Provincial Companies, as against 15 London and 46 Provincial Companies in 1899; the total authorized capital being £10,744,944, as compared with £8,854,444. Of this amount, £7,619,466 has been called up and £3,180,680 has been borrowed; the corresponding figures being £6,559,427 and £2,262,695 respectively. With regard to revenue, public lighting brought in £30,235, and the sale of energy and other receipts realized £1,353,544; these figures comparing with £25,743 and £1,102,386 in the previous year. The amount expended on maintenance was £962,146. The total sum standing to the credit of reserve at the end of the year was £283,229, of which £90,484 (together with £369 for interest) was set aside during the twelve months under review. The total of the depreciation funds at the end of the year was £462,838, of which £91,678 (together with £477 interest) was provided during 1900. The net profit for the year is put at £321,880, which is a decrease of some £23,000—the amount for the previous year having been £345,000. This is discouraging, though, on the other hand, it is satisfactory to find that only 13 out of the 63 Companies have had to declare a net loss on the twelve months' working. Out of these 13 Companies, the loss in only five cases runs into four figures—the Crystal Palace District Electric Supply Company having the very doubtful honour of first place with a balance on the wrong side of £3000. The particulars as to prices charged and units of energy generated and sold are so incomplete as to be practically worthless; many of the Companies neglecting, from some cause or other, to furnish this information. The final column of the returns is headed, "Dividend paid on ordinary shares;" and to this one naturally turns with some curiosity. But here, again, unfortunately rare modesty has in some cases been displayed, for the words "not stated" occur no less than eight times. Of the 63 Companies, only 27 admit to the payment of a dividend on their ordinary shares; the St. James' and Pall Mall Electric Light Company taking first place with a distribution at the rate of 14½ per cent.;

while Northampton comes last with 2 per cent. So much for the Companies. It is not any too brilliant a showing, of course; but then it must be remembered those who put their money in these ventures do so of their own free will, and are not compelled to accept the risk whether they like it or not.

Far different, however, is the case of the undertakings owned by Local Authorities; for here all ratepayers are forced to take part in the speculation, even though they may see clearly what the end must be. They are bound by the decision of the majority, which may not be (and too frequently is not) made up of those who are best fitted to judge of the advisability of committing the town to the heavy outlay which an electric light installation represents. In the returns before us, 165 Local Authorities are represented; and this number includes 12 in London. In 1899, the corresponding figures were 126 and 9. The loans authorized amount to £14,620,787, the money borrowed to £13,636,092, and the sum repaid to £628,312; the corresponding figures for the previous year being £9,840,998, £9,504,558, and £454,689 respectively. The total capital expended at the end of the year 1900 was £14,943,122, as against £10,741,900. The receipts for public lighting came to £194,427, and for the sale of energy, &c., to £1,467,333, as compared with £140,409 and £1,039,442. The sum expended on maintenance during the year was £1,057,728; and the gross profit realized, before providing for interest, sinking fund, &c., amounted to £604,032—the latter figure being an increase of £92,000 over that for 1899. The interest paid on loans at the close of the year was £397,579, as against £255,478. The amount provided for sinking fund during the year was £282,726 (together with £6110 interest); the total at the end of the year, excluding the amount of loans repaid, being £275,585. The sum set aside to reserve for the year was £30,332 (together with £3357 interest); the total reserve at the end of the year being £176,133. The profit, after deducting expenditure on maintenance and interest on loans, was £206,453; while, after providing for the sinking fund, &c., this was transformed into a net loss of £102,931, as compared with a net profit the previous year of £13,860. Of the 165 Local Authorities, no less than 109 show a net loss on the year's working; Birmingham leading the way with the substantial figure of £6485. In the previous returns, out of the 126 Local Authorities included, 49 showed a loss. Among the undertakings which have been fortunate enough to realize a profit, the premier position is occupied by Nottingham, with a gain of £5849. As is the case with the Companies, the Local Authorities' returns with regard to price charged and quantity of energy generated and sold are so incomplete as to be of little use for purposes of comparison. It should be added that in most instances the particulars with regard to the undertakings in the hands of Local Authorities are for the year ending March 31, 1901, while in several cases they extend to an even later date.

ELECTRIC LIGHTING MEMORANDA.

Power, and How to Regard it—What Electric Power is Good for—Its Cost on Works—The Extent of the Demand.

At the present juncture of affairs, exact information respecting the actual and relative costs of the various available methods of providing power for the general purposes of shipyards and engineering works is of particular value. A paper on this subject was read by Mr. D. Selby-Bigge, of Newcastle-on-Tyne, before the Iron and Steel Institute at the Düsseldorf meeting, from which some very precise data are obtainable—not as estimates, but from the cost-books of named establishments. It is hardly necessary to point out to engineers, although the general public need instruction on this head, that nothing is more misleading than to discuss the economics of the generation, distribution, and application of "power," without distinguishing the purposes for which the power is required. Strictly speaking, there is no market for "power," in the general sense, any more than there is for "food" or "drink." We can conveniently proceed from the particular to the general in speaking of all these necessaries of industrial or physical life, classifying motors of all kinds, sizes, and applications as representing power, just as we can and do reckon up in one total the money spent on eating and drinking. But mistakes and confusion result from reversing the order of consideration. Nobody does so in discussing food, or drink, or clothing, which are recognized as generals having no concrete existence. It is quite otherwise in regard to "power," however, and we commonly find persons who should know better, talking at large about "power" without any reference at all, implied or explicit, to the purposes for which power in industry is required and used.

Thus we find people discussing power plants, and their product, in the general, when they should have started from the particular application. As an example of this, there is most of the talk about the capabilities of the large gas-engine. Power, it is stated, can be generated from blast-furnace or cheap producer gas by this kind of prime mover at very low cost. True; but what for? Can a White Star liner, or a cruiser, or a Manchester cotton spinning mill be supplied with power by this means? If not, what is the use of leaving out of the question the chief thing necessary to be considered? The case of the Manchester industry is very much to the point in this connection, seeing that in the locality there exist, side by side, the largest electric power facilities in England and the largest concentrated applications of power. Yet these entities do not touch each other. The cotton mill has no use for the Corporation electric power; and, conversely, the Corporation electric power supply gains nothing directly from the existence of the cotton mill. It is obviously necessary to start afresh, at the other end, and, from knowledge of what is wanted, to determine the best means of providing it. This is where the engineering or shipbuilding works comes into the question, because what they want is power for driving tools and working cranes; and, by the nature of these applications of power, the essential service can be of various kinds. The first kind of power to be made available for the purpose was, naturally steam. It was very wasteful. Works of considerable size were driven by numerous small and uneconomical steam-engines scattered about; and whether the steam was generated in small isolated boilers, or in a central battery of large fixed boilers and distributed by piping, the waste of fuel was enormous.

Many such establishments have proceeded straight from this familiar system to electric driving with power generated on the spot. No very remarkable economy in the steam or gas motor, or the electricity plant, is needed to show a notable gain for the new system. Whether steam or gas power is used initially, the cost of a Board of Trade unit of electricity delivered on the switchboard will not be so much as ½d., including all charges. The consumption of fuel will be reduced by one-half. Even for so small a power demand as 112 indicated horse power, this is being supplied in a shipyard on the North-East coast at a cost of only 0·6d. per electrical horse power per hour—this figure including all charges, interest, and depreciation (Selby-Bigge). And the output of the machine tools is increased, by the same means, by at least 30 per cent. It may well be asked what is the prospect of a works which is able to supply its own requirements in this respect becoming a customer of a municipal or any other electric power selling concern? Allowing that these prices are for power at the switchboard, thus leaving out the waste by the machines, whereas a bought supply would be at the machines direct, the margin would not be above 25 per cent. Thus ¾d., at the outside, is the cost to the works of an electric horse power actually expended on the tools and the machines. There is no electricity-in-bulk supply on offer at anything like this figure. Add another 25 per cent. for "on cost" charges not included by Selby-Bigge's correspondents, and the cost of the unit is still only about 1d.

This is not all. Not only is home-made electric power, whether generated by steam or small gas-engines—and this choice must be governed by works considerations—much cheaper than the bought article ever can be, even when partly paid for out of the rates; but, after all, the quantity required is not so large as to encourage the belief that a profitable trade could be made of it. At a shipyard on the North-East Coast, the substitution of electricity for steam driving shows a saving of 43½ per cent. Well and good; and the average cost of all the power needed in the works was never more than 8·66d. in the pound of the wages-sheet. Now it is reduced to 4·88d. in the pound. In amount, this particular works spends about £2500 a year for power, to about £127,000 a year in wages. There is not the remotest prospect that the local authority, or any outside provider, will ever get this account, because they could not possibly do the work at the price. Even if they did, there would not be any money in it. All of which goes to show how very thin is the power-in-bulk business, from the outsiders' point of view, even in the most favourable localities, where the work to be done is such as they might hope to be able to compass. And where power is used, not for engineering work and shipbuilding, but for the driving of cotton mills, and weaving sheds, and iron works, for which the only suitable power has to be of special character, the opening for distributed electric power simply does not appear at all.

THE SEASON OF GAS-FIRES: FASHION IN FIRE-GRATE DESIGN.

With the approach of another winter, the thoughts of the householder naturally turn to the vexed and vexatious subject of domestic fires. Of course, the dealers in fire-grates have long been preparing for the new season's trade; so that what we have to say on the topic of fashion in the design of this class of goods does not particularly appeal to them. Their stocks are mainly ready, or in active preparation, to fill orders for the show-room; and they doubtless hope that the stock patterns upon which they have laid out their money will take the purchaser's fancy. There is, however, an aspect of this large subject which does not necessarily appear in manufacturers' catalogues, and is not easily recognized by the public, although it really is the most potent of all considerations in this connection. We have already mentioned it by name incidentally, and now propose to discuss it at some length. It is the rule of "fashion" in such things—that intangible, all-powerful influence which is really one of the most potent of the forces of civilization in trade matters. There is a fashion in the design of the domestic fire-place and its accessories which it would take a substantial volume to trace. There is also, as engineers are likely to realize better, a science of the domestic fire

place, which had its rise in the researches and experiments of Count Rumford. But the point here is that fashion, which is largely fancy, has in fact had more to do than science with the development of the modern domestic fire-grate.

This is our starting point, which we desire to make particularly plain and clear to gas engineering readers of the "JOURNAL," who are specially interested in the modification of the domestic hearth which has gas for its fuel. As a rule, engineers are apt to set more store by what they recognize as science, than by what strikes them as mere fancy. This very natural, and, in its way, proper, predilection on the part of gas engineers has not tended to make gas-fires more popular with the general public, who are attracted by the pleasure of the eye rather than by the light of reason. The smoke preventionists and the fuel economists have taken the domestic fire-grate in hand, and very weird were some of the productions upon which these would-be reformers of the hearth have smiled. But the public did not buy these goods. Engineers have rather hankered after the scientific in grate construction, while the public have been taken with mere prettiness in grate design; that is the difference. Therefore, the engineering mind has been satisfied with types of gas-fire construction which did not appeal to the householder, who simply declined to live with them.

This is not to say, of course, that the popular taste in fire-grates has not been at all affected during recent years by considerations of good sense. Far otherwise, indeed, since the rise of such instructed public taste as exists in this regard is directly traceable to the introduction of the well-known "country parson" style of grate, with solid fire-clay fuel chamber, and iron bars only in front. The public wanted to save coal, but did not like a dull fire. Consequently, the severe simplicity ot the slow-combustion pattern of fire-place, with no bottom fire-bars at all, had to be modified in order to overcome this objection. Thus the fashion of "blower" fire-grates came in, and lasted for some years. There was nothing new in a blower. But there was novelty in making it a part of the grate, free to be slid up or down, and held in a notch at any height required. So strongly did the tide of fashion set in this direction, that for a long time the public would look at no other pattern of firegrate—except the so-called "dog grate," which was a simple fire-basket standing independently of the fire-place, and the direct antithesis of the blower grate. The reason for this alternative fashion is to be found in the circumstance of the fire, in the case of the blower-grate, being right back in a recess where it could only be seen from the direct front. Those who like to see as well as feel a fire preferred the open dog-grate, where the chimney draught was good enough to allow of its comfortable action. This condition was often lacking in town houses. Otherwise, the dog-grate gave much satisfaction, and was economical of firing.

It was supplanted in the public fancy, however, by the fashion of the "canopy" fire-grate, which merely aimed at combining the features of a prominent fire with some draught-regulating device. The canopy is a blower, but hanging down in front from a hinge at the top of the frame of the grate instead of sliding vertically in it. Thus it could be pushed out or in at will; and being always in view, it lent itself well to decorative treatment. It was vain to attempt to sell the old-fashioned blower fire-grate after the canopy grate came in. So much for fashion, which in all this had little regard to such scientific points as the suppression of smoke, economy of fuel, or saving of servants' labour. The chief thing kept in view was decorative effect, in which the beauty of the fire itself was a conspicuous feature, and, in the second place, the avoidance of trouble from flues not so good as they might be.

During the last year or two, the canopy grate itself has been largely superseded in smart furnishing ironmongery by a pattern of "well" fire-place, in which the fire appears to burn directly upon the hearth, without front bars. In order to effect this object with coal for fuel, a device of sunken bottom bars is essential, with air supply entering invisibly underneath the fender curb, In this way, the view of the whole of the top of the burning fire is secured, and the decorative effect of the hearth is materially enhanced. Almost needless to say, however, the possibility of burning anthracite coal or coke in such a fire-place is non-existent. This is a lamentable commentary on the value of the propaganda carried on with such devotion to science by smoke preventionists. But the fact remains, that it is at present the most stylish line in the furnishing ironmonger's stock. What is to be said for it? Merely that this is the latest fashion in such matters; and beyond this there is nothing to be usefully advanced. The public who can afford to please themselves with their domestic hearths will not be dictated to in the name of any cause, such as that of aerial sanitation, in which they are not interested. So long as they like a particular description of fire-place, or anything else, they will have it; and who shall say them nay?

Meanwhile, the gas-fire has a formidable rival to meet in these pretty and fashionable fire-places, which are made on all sides at very low prices. The art of fine casting in iron, with or without embellishments in other metals, has been admirably cultivated of late years, as will appear by comparing this season's catalogues with those a few seasons old. Moreover, absolutely no progress at all appears to have been made by either the French and German, or the American makes of close stoves put upon the English market some years ago. A handful of enthusiastic reformers patronize these useful and economical appliances; but there is no trade in them. In these circumstances, it is pertinent to inquire what makers of gas-fires are doing to compete on something like common ground with fashionable fire-grates. This is a branch of business to which the reproach of municipal or gas company trading in competition with the ironmongers does not to any extent apply. It is a trade, however, in which the direct dealing of purchasers with manufacturers might well be encouraged by gas companies and gas committees, in view of the fact that ironmongers will not ordinarily carry a sufficient stock to attract buyers. The weakness of the gas-fire trade lies to a large extent in the infatuation of manufacturers for their own models, which they try to force upon the public regardless of the changes of fashion in the matter of fire-grates. The consequence is, that gas-fires only go into offices, consulting rooms, sleeping apartments, and other interiors where the appearance of the hearth is not the first consideration. It is impossible to argue people into liking a thing which they detest, as many do gas-fires. If a man likes a coal-fire—and this is the general taste—he will have it wherever he can, regardless of all the scientific talk about smoky skies and all trade advertisements to the contrary.

There is a margin of possible demand, however, which may be at least partially supplied by the gas-fire, if only it is turned out with a prudent regard for the tendency of the ruling fashion. Whether the public taste is for a blower grate, a canopy grate, or a "well fire," there is no reason why the makers of gas-fires should set themselves against it. We quite expect that a number of highly-respectable manufacturing firms will gaze in astonishment at these remarks, and protest that their wares are "artistic," whatever might be said of those of their rivals. The castings are excellent, and the pattern makers are the highest-paid artizans in their line. Of what, then do we complain? Only that the public do not even yet take so kindly to gas-fires as they would if they did not dislike them so much. It is not only the cost of this means of warming; although that is not a negligible consideration in many localities where gas is thought to be dear. One would like to know that gas for heating is esteemed upon its merits, as it is for cooking; but this is far from being the case. We make no doubt whatever there are many householders of limited means who are at this moment dreading the coming winter as much on account of the labour and dirt of the household fires as for any other reason. They cannot bring themselves to have gas-fires put in their rooms instead, because they do not like them. It is possible that some of this reluctance might yield to gentle and sympathetic treatment.

Attention to the details that mean so much to the user of a fire-place as distinguished from the seller of it, and, if possible, success in beating the fire-grate people at their own game of making a pretty fashion go, would place the gas-fire upon a better footing than it has ever enjoyed. The oracles of science, like the late Dr. Lawson Tait, who did the whole thing years and years ago, somehow leave the public cold and unconvinced. Something less oracular and more persuasive is needed. It is idle of anyone to declare that he has burnt nothing but gas or coke in his house for thirty years, and is quite satisfied, if another declares that he would not live like that if he were given the house and firing free. It is the popular taste that should be moulded; and of attempts in this direction there are few or none to chronicle as the seasons roll by.

MUTUAL SCHEMES UNDER THE WORKMEN'S COMPENSATION ACTS.

THE report of the Registrar of Friendly Societies as to his proceedings under the Workmen's Compensation Acts of 1897 and 1900, does not show that the method of carrying out the provisions of these Acts by employer and employed entering into a "mutual scheme" is being more widely adopted than it was in the early days of the operation of the 1897 Act. Only three fresh schemes were sanctioned by the Registrar last year; and as only 132 workpeople were thereby affected, it will be seen that the extension of the idea has been practically negligible. This we very much regret, as we are sure that a properly thought-out "scheme," worked in conjunction with other benefit societies connected with a works, is a much more satisfactory method of fulfilling the requirements of the Acts than either meeting the liabilities arising out of them through an insurance company, or paying compensation for accidents strictly in accordance with the text and schedules of the Acts. The "mutual scheme" method makes for friendly relations between master and man, which neither the "insurance" nor the "legal claim" method does. In fact, either of the last two has in it the seed of discontent on the part of the men, so that the good employer who, before the 1897 Act was passed, used to compensate his workmen out of compassion for them, and thereby earned their gratitude, now, if he simply pays what the Act requires him to pay, in accordance with the schedules, has probably to part with the same amount of cash as before, and gets no gratitude in return. If, on the other hand, the compensation be done through the benefit society, supported mainly by the employer, the legal

aspect of the business is lost sight of, and the friendly relations will remain.

To that extent, and also by reason of his annual liability in respect of compensation being practically fixed under a scheme, instead of fluctuating, sometimes violently, according to circumstances if legal claims be paid as they arise under the Act, the employer benefits by adopting a mutual scheme. The benefits to the workmen are equally considerable. They are freed from any risk of their claims being contested by an insurance company on legal technicalities, or by the employer if he settles claims direct. A benefit society, working a mutual scheme in connection with a sick fund, would not split hairs over such points as whether an accident arose out of the man's employment or whether a building was 20 ft. or 19 ft. 6 in. high, or similar questions of a "when is a door not a door?" character. Under a mutual scheme, provision is generally made for compensation from the date of accident—a substantial boon to the injured. But one of the principal advantages of a scheme, in our opinion, is in regard to compensation for fatal accidents, and accrues to the dependants of the deceased workmen. The Act provides for the payment of a lump sum of not less than £150, nor more than £300, to the dependants. Most schemes provide instead for the payment of annuities.

Now anyone who is acquainted with the domestic economy of the poorer working classes, and the improvidence and ignorance of not a few of the women folk, will agree with us when we say that, in a considerable proportion of cases, to hand over to a widow such a sum as (say) £200 is calculated to do her more harm than good, or is at any rate not likely to bring her one-half as much benefit as it should do. An extravagantly expensive funeral for the husband, elaborate mourning for herself and family, and a drunken orgie for the "friends" who come buzzing round like flies round a honey-pot, are frequently items in the programme; and if a woman is unfortunately not of a strong mind, and has a disposition to drink more than is good for her, the possession of a large sum of money—more pounds possibly than she ever had pence to handle at one time before—is very likely to work her complete ruin. Employers ought, therefore, if they pay compensation direct, to endeavour to get the money tied up by the County Court rather than let it go in one lump sum to the dependants. But the best way of all is for the compensation to take the form of an annuity for the widow or mother of the deceased, and additional provision for young children.

Such an arrangement is set out in the particulars given of the principal scheme certified last year. The payment on death by accident is fixed at £15—sufficient to provide for decent burial, mourning, and the payment of debts—with a subsequent annuity of 6s. per week to the widow and 1s. 6d. per week for each child up to thirteen years of age. If a workman were asked which he would rather should be paid to his widow in the event of his accidental death—the foregoing, or a lump sum of £200—in nine cases out of ten he would declare emphatically in favour of the first alternative; and the fact that under a scheme such an arrangement could be made would be a strong inducement to a body of men to assent to adopt the scheme.

In regard to the schemes now in operation, the report shows that out of 137,205 workpeople employed, 133,604 have given their adhesion to the schemes—one condition of which, it will be remembered, is that its acceptance by any workman shall be voluntary, not compulsory. In 40 out of 51 cases, including that of the South Metropolitan Gas Company, all the men in the employment are assenting parties; while in 7 others 95 per cent. or over have joined. In only one case is the percentage below 80. Evidently, therefore—in spite of the hostility of the Trade Unions towards them—the schemes are not looked upon with disfavour by the great majority of the men concerned. In returns relating to 28 schemes, particulars are given from which a comparison can be made between the amount of the payment made to injured men during incapacity and the maximum amount that would have been payable under the schedule of the 1897 Act—assuming all the cases to have been such as would have entitled the workman to claim under that Act. From this, it appears that the actual payments exceeded the maximum payable by 72 per cent. This is largely accounted for by the provision made for the first two weeks of incapacity.

In the aggregate, the employers concerned in the 51 schemes in operation contributed £77,993 in the year, and the workmen £49,174. Payments on death amounted to £17,227; during incapacity, to £56,202; other benefits accounted for £8735; and the balances in hand increased by £38,598. Owing to the granting of pensions to dependants, the payments on death will for some years increase considerably; so that the increase in accumulated funds is necessary in order to ensure solvency in future. The number of deaths was 211; but the proportion of cases in which dependants were left was exceptionally small—there being no less than 45 cases of "no dependants." The number of cases of incapacity from injury was 20,345, or 1 in 7 of the total number of men joining. In the case of the South Metropolitan Gas Company, the proportion of accidents causing incapacity was only 1 in 18 of the number employed, comparing very favourably, it will be seen, with the total average.

The Registrar is of opinion that, taking into account the extra benefits received (£8735), the payments during the first two weeks of incapacity, the subsequent payments in excess of those provided by the Act (estimated at £23,000), and the increase of £38,598 in the balances carried forward, the workmen derived from the various schemes a full equivalent for the £49,174 that they contributed. We should be glad to see the example of the South Metropolitan Gas Company in adopting this method of dealing with their injured workmen followed by other of the gas undertakings in the country. It would, we are convinced, be of benefit to both them and their workmen.

REESON'S GAS AND WATER ACTS.*

NOTHING is called for on our part by way of testimony to the need for a complete textual collection of the statutes under which the supply of gas and water by companies or local authorities is authorized for the United Kingdom. These enactments are so numerous and voluminous, that the practice has grown up of embodying portions of them in Private Acts by reference, with a view to the saving of expense and also of keeping Private Acts within reasonable length. The practice has its own disadvantages, which are not slight. It presumes familiarity with, or at any rate ability to produce when called for, every Act referred to in this way, which is an onerous obligation at best, and is not infrequently vexatious also, especially when the reference is itself referred to something else. But if the interpretation of a Private Gas or Water Act is rendered difficult by this custom of legislation by reference, the drafting and carrying through Parliament of a Gas Bill is very much more so, owing to the incessant calls for the exercise of judgment as to what should be put in or left out at the proper time. The burden and responsibility of the advisers of promoters and opponents of Private Bills are much aggravated by the physical inconvenience of having to refer to selected passages occurring in a mass of separate statutes, some of which may get overlooked or mislaid in the process of handling in hurried moments. It is by no means a rare incident for the prospects of a Bill to be materially affected by an accident of this nature. So keenly has this risk been felt by some gas companies of much parliamentary experience, that they have had prepared reference books of their own, to show at a glance the statutory provisions under which they exist. Ordinarily, of course, "Michael and Will" teaches the general law, as also the statutory requirements of gas and water undertakings; but the scope of this book does not include all Acts to which reference must be made on occasion.

The gas industry of the kingdom is indebted to Mr. Joseph Reeson for a book of the Acts which is quite unique in its way. It is designed as a comprehensive, trustworthy, and handy book of reference for the use of directors, local representatives, engineers, public officials, and others concerned in gas and water affairs, and consists of a complete compilation of all the Acts and enactments in force in all parts of the United Kingdom, as applicable to both companies and local authorities, brought up to date. The matter relates not only to the main subject, but also to all kindred or ancillary subjects, including the laying of mains and pipes underground and in subways, the protection of pipes from interference and injury, the law of nuisance as applying to factories, and the pollution of streams and water springs. A special feature is made of the arrangement and indexing of all this mass of matter. There are three tables of contents, arranged respectively according to chronological, alphabetical, and subject-matter order. The index is to sections as well as to pages, and occupies one-fourth of the volume. The Metropolis is specially dealt with, by the inclusion of all provisions in force as to gas supply under the Special Acts of the London Gas Companies; and the compiler's competence for this task is indicated by the fact of his having had over forty-two years' intimate official experience in the framing and carrying out of these provisions. Ample notes, explanatory and directional, are given with the text. The author of these notes, however, is careful to point out that they do not touch upon legal views, readings, or decisions, "nor with any such questions as are usually referred to legal advisers." This is no law book, as the term is commonly understood. The notes give references to repealing and amending enactments, and also to supplementary or corresponding provisions. They also name the short titles of Acts, and note changes in local authorities charged with their administration and so forth. The book, in short, is for the man of affairs; and to say that it must forthwith find a place on the board-room table of every gas and water company and of every municipal committee room, is to state what is evident from what has already been remarked.

The volume is divided into two parts—the first being of general application throughout the kingdom, and the second applying to the London Gas Companies. The order of the Acts as printed is chronological, thus enabling the gas legislation of any epoch to be pitched upon at once; while this arrangement enables a view to be had of the course of development of legislation. A valuable guide to the reading of the law is given by references to the Interpretation Act, 1889, and by the foot-notes, which make it clear on every page, including those giving the tables of contents, what

* "Reeson's Complete Gas and Water Acts, 1817-1902. The Acts relating to the Supply of Gas and Water by Companies and Local Authorities, with Reference Notes and Full Index." Compiled by Joseph Reeson, late Assistant-Secretary and Registrar to the Gas Light and Coke Company. Complete to Adjournment of Parliament, August, 1902. London: Butterworth and Co.

localities are in question. This is an enormous help, and is alone worth the price of the work.

When one speaks of "General" Acts applying to gas supply, the natural limitation of the subject-matter must be understood. Persons who engage in this or any other occupation, being subjects of the realm, are obviously amenable to all the common law, and to very many statutes which apply to all responsible citizens, and these laws are of too general a character to be included in such a work as this. When one comes to consider what are the Acts which apply to gas companies in general, the choice is rather difficult. What, for example, about the Companies' Clauses Acts, the Lands Clauses Consolidation Acts, or the Arbitration Act, 1889? Mr. Reeson does not include these in his contents, which may be taken as an indication of the character of the limitation he has imposed upon himself. It is the same with the statutes applying to the conduct of the manufacturing operations of gas-works as factories or workshops. The line must be drawn somewhere, of course; and all that need be remarked on this head here is that Mr. Reeson has drawn it in one place, and "Michael and Will" sometimes places it somewhere else. Incidentally, it is one of the merits of Mr. Reeson's exhaustive index that it shows immediately whether a particular matter is included or not. No fault can be found with respect to the omission of Gas Acts proper, seeing that the list begins with the celebrated "Michael Angelo Taylor's Act," which is dated 1817. It so happens that the treatment dealt out to this remarkable enactment furnishes a striking example of the weakness of legislation by reference in subsequent Acts. The same observation applies to the Lighting and Watching Act, 1833.

Like so much more pioneer legislation, many of the powers conferred by these Acts were made adoptive, and were restricted in application to certain places and by particular authorities. Subsequently, the restrictions were removed; and eventually, instead of clearing the old Acts out of the way and reincorporating their useful and surviving provisions in new statutes, the fashion was adopted of re-enacting them "so far as the same are not inconsistent" with a mass of later law. This way confusion is created. Mr. Reeson has a sharp eye for such points, and his foot-notes are particularly useful in this respect. He has felt constrained to include a number of other Metropolitan Acts in his first part, or with General Acts, which goes to show still further that the word "General" has a peculiar significance for him. It cannot mean precisely the same with regard to the Sale of Gas Act, 1859, and the Metropolis Gas Act, 1860, which immediately follows it in the text. The difficulty of classification may be admitted; but it would perhaps have been appreciated if his categories had been still more strictly drawn up. A provincial gas director might wonder what he has to do with a Metropolis Gas Act, or a City of London Subways Act. On the other hand, the Tramways Act, 1870, is truly of general application; and it is convenient to have this, as well as the Petroleum Act, 1871, at command. Several other Acts, not usually bound up with Gas Law, but directly bearing upon it in some way, are also included.

There is not much that need be said concerning the contents of the second part of the book, which gives extracts from the Special Acts applying to the London Gas Companies, in order, up to, and including, those of the adjourned session. Those who desire information as to the actual settlement of the South Metropolitan and Commercial Gas Companies' affairs will find it here. Both Companies can supply 14-candle gas, under the sliding-scale; but whereas the South Metropolitan initial price of this quality gas is 3s. 1d. per 1000 cubic feet, that of the Commercial Company is to be 3s. 3d., as from the beginning of next year. The appendices of the book comprise the Board of Trade rules with respect to proceedings under the Act of 1870, and the regulations applicable to the electrization of tramways, and to electric lighting undertakings. The bye-laws of the London County Council relating to the use of subways are also given. After all, we are not sure that Mr. Reeson's model index is not the glory of his volume; it is so complete and detailed. We have tested it in several particulars, and found it reliable. After what has been said, it is scarcely necessary to insist on the value of the book for all whom the subject may concern.

THE CULT OF THE GAS EXAMINER.*

[Second Article.]

Our first article (*ante*, p. 806) dealt mainly with the general relations of official gas testing at the present day to the gas industry, as revealed by Mr. Abady's practical demonstration of his convictions anent the requirements of the modern gas "analyst" in the matter of text-books. We deplored the necessity for so voluminous a work as he has produced, and regretted that he had not thought it expedient to discuss the broader issues involved in photometry as applied to the control of gas supply in London and elsewhere. We now propose to indicate more closely the manner in which he has treated particular branches of the gas examiner's work.

The bar photometer is pretty fully discussed, and, on the whole, in an intelligent manner. But we regret to see that he follows a bad, but well established, precedent in stating that "the bar is of polished wood, and is graduated . . . " It is time that something more legible and durable than the customary more or less black graduations on a polished and lightly stained or natural-coloured wood bar should be provided for bar photometers. The difficulty of making readings on such a scale, when feebly and partially illuminated, is great, and the gas examiner should be spared it. The scale should be in black lines, with distinct figures, on white celluloid, enamelled glass, or ivory. A substantial gain in precision and utility over the common scale on "polished wood," as advocated by Mr. Abady, would thus be achieved. The Gas Referees deserve the thanks of all interested in the accuracy of gas photometry for having banished polished wood and burnished brass—the fetishes of the old-time photometer-maker—from their standard table photometer.

With regard to this instrument, we found Mr. Abady's description by no means so clear as we could have wished, and we began to wonder to what extent he had copied the official specification. The latter is contained in the "Notification of the Gas Referees;" and we suggest to any gas examiner who may be called upon to use the table photometer, that he may find it expedient to purchase a copy of this document rather than rely solely on Mr. Abady's description of this apparatus and his instructions for its use. We have taken the trouble to compare the two accounts of the table photometer, and find that Mr. Abady and the Gas Referees are at issue on several points, which we need not refer to in detail, as they are not of moment to anyone but gas examiners, who may as profitably spend their time in looking up the points of difference for themselves as in making tests of gas. It is true their official superiors may not view the matter in this light, and may call upon them to choose once and for all between the Gas Referees and Mr. Abady.

Meanwhile, however, we doubt if the public would be one penny the worse through the omission of tests while the gas examiner is having a few hours' mental relaxation with Mr. Abady's chapter and the Referees' specification before him. We are afraid, however, that Mr. Abady is somewhat at a disadvantage, as compared with the Referees, in prescribing the construction and use of their apparatus; for they speak with the authority of officialdom, and withal with greater clarity of expression. At times we cannot follow Mr. Abady's meaning, as, for instance, when, in describing Mr. Harcourt's pentane standard lamp, he says: "The brass chimney C mentioned is surrounded by a larger brass tube D, which, being heated by the inner products of chimney, causes an intake of air." Mr. Abady also evidently considers this lamp susceptible of improvement. He says: "The fault with the lamp seems to be the difficulty in getting a clean-topped flame, and on this account the variation in the sizes of flame through which the power is correct is very limited, and there is the chance of the mean height of the flame being adjusted at too low or too high a point when the power of the standard is altered." There is probably some good sense underlying this criticism; but it is not easy to detect. When does occasion arise to alter the power of the standard; how is it done; and why is it that the chance of faulty adjustment of the height of the flame occurs when the power is altered? We have not, it is true, had the standard at hand to try if experiment elucidates Mr. Abady's meaning; but we fancy other readers besides ourselves will not expect to have this trouble cast upon them. Surely Mr. Abady could have made it plain what, in his opinion, is the matter with the lamp.

Passing from photometry to calorimetry, we are disposed to think Mr. Abady overrates the value of tests of the calorific power of gas. It is by no means proved that the calorific power of gas bears any direct relation to its utility, except in certain applications which have a very limited sphere. Mr. Thomas Fletcher not long ago dealt with this point in the "Journal." Bearing this in mind, we would impress upon gas managers the necessity of resisting all attempts to impose a statutory limitation on gas undertakings in respect of the calorific power of their gas. The gas examining *clique* is, of course, prepared to vouch for the great value of statutory calorimetric tests in safeguarding the interests of gas consumers; but a few leading questions should serve to expose at once the depth of their ignorance on the subject. Naturally, the self-interest of every gas examiner impels him to hope that he will be called upon to test gas calorimetrically as well as photometrically, and to determine the carbon monoxide present, along with the ammonia and sulphuretted hydrogen. But he must not be allowed to persuade Parliament or the Board of Trade that his interests are of paramount importance when so large an issue as the provision of an adequate and cheap gas supply to a large district is being settled.

We do not think Mr. Abady makes out so good a case as he might have done for a more general employment of the calorimeter on gas-works and in gas-testing stations. A logician would find great fault with his opening pleas for fuller recognition of the gas calorimeter. When we pass on to his description of the manner in which a test of the calorific power of gas should be made, we think his plan of stopping the test at some point short of a complete revolution of the drum of the experimental meter is distinctly bad, especially as he does not insist upon the use of a governor between the meter and burner, though incidentally he takes advantage of the governor on the photometer bench when he suggests that the calorimeter should be supplied from the

* "Gas Analyst's Manual" by Jacques Abady, M.Inst.Mech.E. (Incorporating F. W. Hartley's "Gas Analyst's Manual" and "Gas Measurement"). London, E. & F. N. Spon, Limited; 1902.

burner pillar of the latter. The calorimeter, however, is often used apart from the photometer, and directly connected with the experimental meter, as Mr. Abady shows in his illustration. Even the best experimental meters deliver at slightly varying rates at different parts of the revolution of the drum; and unless a governor is used to control the delivery to the burner, it is essential to accuracy that calorific tests should extend over one or some integral multiple of one complete revolution of the meter-drum. It would be better to use a meter of smaller capacity than rely on the delivery being uniform throughout the revolution of the drum of a relatively large meter.

Mr. Abady next deals with "purity" testing, and gives copious extracts from and digests of the Gas Referees' regulations. Here, again, we advise any gas examiner who is called upon to work under these regulations to refer to the Referees' own publication. Directions for testing coal and other gas-making materials and bye-products follow, but do not appear to differ very greatly from those given in many text-books. In the chapter on "Technical Gas Analysis," the most important feature is the description of a modified form of Hempel's apparatus for analyzing mixtures of gases. This modification appears to be well conceived, and worthy of trial. It is, of course, impossible to speak more favourably of it without actual experience of its use; but we are disposed to regard the account of this apparatus, which has been designed by Mr. J. G. Tapley, as the most useful part of Mr. Abady's book.

Perhaps, however, we should make an exception in favour of the last chapter, which deals with "Meter and Governor Testing." This is uniformly good, and should prove very useful. Of course, it is of no direct interest to the gas examiners, to whom the earlier portions of the book will more particularly appeal.

In conclusion, we would say that, although we have found it impossible to express unqualified approval of Mr. Abady's conception of what a revised edition of Mr. Hartley's manuals should comprise, and although we think the book needlessly pretentious, we believe it will be useful, especially to public officers concerned with the testing of gas and meters. There are a number of obvious misprints; but speaking generally, the book is well printed and illustrated. The numbers in the index refer to paragraphs, not pages, which mode of indexing is, we think, very objectionable. The busy man will invariably turn up the page, despite all warnings that the paragraph so numbered is what he ought to look for. Further, a note which crops up repeatedly throughout the book, to the effect that "Pars—and—are left blank to facilitate additions in a future edition," is irritating to the reader, who soon comes to the opinion that the author and publishers might have laid their plans for future editions in a less obtrusive fashion. However, we trust that Mr. Abady may soon have an opportunity of amending these and other faults in his book by a new edition being called for at an early date.

POWER-GAS PLANT.

At the present time, when the advocacy of the gas-engine as a prime mover is very much to the fore, a welcome may be extended to the little book in which Mr. Alfred Wilson, of Stafford, sets forth the merits of his power-gas plant.* Mr. Wilson has been a designer of fuel-gas producers for many years; but only recently has he modified his apparatus with the express object of producing a gas suitable for the direct generation of power. It is as well to know that there is an ample range of choice in the matter of gas plant open to the users of large gas-engines; and it is not for us to indicate the best. The significant thing to remember is that where gas for power generation is made from bituminous coal—or, indeed, from anything but the cleanest and purest anthracite—proper gas purifying plant is necessary. A holder is also a good thing to assist in regularizing the working. In short, a power-gas works of this class will not differ much from any other gas-works. The Wilson plant is calculated to gasify the poorest kind of coal, and does not set much store upon ammonia recovery when the consumption of coal is less than 50 tons per day. On this footing, the cost of gas required to generate power comes out at 0·076d. per indicated horse power per hour, for a 500-horse power plant, with slack costing 6s. 3d. per ton delivered. On the same basis, the gas will cost 0·8d. per 1000 cubic feet, for raw materials, labour, stores, interest and depreciation at 10 per cent. on the capital cost, and cartage of the ashes. For engineering works, Mr. Wilson favours gas power distribution as compared with electricity, while admitting the occasional utility of the latter. It is to be regretted that the author does not support his claims with records of accomplished facts, instead of putting them forward as mere estimates, which may or may not be realizable.

* "Power Gas Plant." By Alfred Wilson, of Stafford. Published by the Author; 1902.

THE GAS AND WATER STOCK MARKET.

(For Stock and Share List, see p. 890.)

The general position of things on the Stock Exchange last week was about a repetition of the preceding week. The tendency almost throughout the list was very flat, and in one or two departments there was a considerable fall in prices. Dear money was still the depressing factor. Consols were very weak at one time, changing hands repeatedly at less than 93, and once at 92⅞; but they recovered later on. The settlement was the chief event of the week; and fresh business was not much in evidence. The condition of the Money Market was a source of anxiety, and many had made up their minds that the Bank rate would go up on Thursday. However, the Directors thought there was no necessity for an advance; and, notwithstanding the usual requirements of the season, it is possible we may yet be able to get along with a 3 per cent. rate. To meet Stock Exchange and other demands, there was no shortage in the supply of ready money. Business in the Gas Market was not as active as the previous week, and towards the end, after the conclusion of the settlement, it fell very quiet indeed. The general tendency was in favour of easier prices. We believe this to be wholly attributable to the state of the Money Market, and without any relation to the position and prospects of the Companies. We know that the first half of 1902 has been a prosperous period for gas undertakings in general, and, so far as we can see forward to the end of the current half year (of which one moiety is completed), there is no reason to fear it will be worse than the first. In Gaslight issues, the ordinary was only moderately active. It opened steady, and marked 89 on Monday; but quickly afterwards it began to give way, and changed hands at 87 on Thursday. Of the secured issues, the maximum held pretty stiff; but the preference was rather shaky, and fell a point. South Metropolitan opened with a bargain at 123; but this price soon shrank, and on Thursday a transaction was marked at 120, though subsequent dealings were rather better. There was nothing in Commercials except one "special" bargain at special figures. In the Suburban and Provincial group, Alliance and Dublin was noticeable for a nice advance. Business in the Continental Companies was quiet. Imperial was steady; but European showed further weakness, and the price dropped. Among the remoter undertakings, Buenos Ayres debenture was lower. The Oriental Company have now completed the consolidation of their three classes of shares and their conversion into stock—a very desirable measure, and one beneficial to the Company—and the stock will shortly be quoted. Business in Water was quite unimportant, and there was not much change in prices.

The daily operations showed no change in prices on Monday. On Tuesday, Alliance old rose ½; but Gaslight ordinary and preference and South Metropolitan ordinary and debenture fell 1 each. In Water, East London rose 2. On Wednesday, Buenos Ayres debenture fell 1. East London Water rose 1 more. On Friday, Alliance old rose ½.

PERSONAL.

Mr. A. J. Harrison, at present Manager of the Sileby (Leicestershire) Gas Company's works, has been appointed Manager of the gas-works of the Milton-next-Sittingbourne District Council.

Mr. George R. Booth has been elected Chairman of the Sunderland Gas Company, in place of Mr. James Stokoe. The vice-chair, which has been for a long time occupied by Mr. Booth, has been taken by Mr. S. P. Austin.

Mr. John Pethybridge, who for some years has acted as Secretary of the Bodmin Gas and Water Companies, was last week elected Town Clerk of the borough. In order to take up this new appointment, Mr. Pethybridge has resigned his seat on the Town Council, and will also relinquish his connection with the two Companies.

We are informed that the Birmingham Gas Committee have appointed Mr. John Foster, the Gas and Water Engineer to the Leigh (Lancs.) Corporation, to the position of Resident Works Engineer at their Windsor Street Station. Mr. Foster has been at Leigh since 1897, previous to which time he occupied the position of assistant to his father at Nelson, as well as that of Engineer to the Electric Light Department of the Corporation.

The position of Manager and Secretary to the Hertford Gas Company, rendered vacant by the removal of Mr. R. Watson to Doncaster, has been filled by the appointment of Mr. H. D. Duesbury. Mr. Duesbury, who received his early training at Derby, has occupied the posts of Assistant-Manager to the Cambridge Gas Company and Manager of the Carnarvon Gas-Works, as well as his present position of Manager and Secretary to the Hoddesdon Gas Company.

Last Friday the officers and men of the Ramsgate Corporation Gas and Water Department, presented Mr. William A. Valon and Mr. Arthur Valon with a remembrance of their connection with Ramsgate. It will be recollected that both gentlemen have relinquished their official positions under the Corporation, in order to devote themselves exclusively to consulting work, in which connection they will still be linked with the town. We understand that the Magistrates and Town Council of Ramsgate have met together for the purpose of considering the making of "a suitable presentation to Mr. Valon in recognition of his services to the town."

OBITUARY.

We are informed by Mr. W. E. Roberts, the Assistant-Manager of the Woolton Gas-Works, that the death occurred on the 13th inst. of Mr. HENRY HATCH, the Manager of the Company. Mr. Hatch, who was 61 years of age, had occupied his position at Woolton for 36 years.

We are sorry to learn of the death, on Sunday morning last, of Mr. STEPHEN CARPENTER. Deceased, who at the time of his death was 74 years of age, was for 46 years connected with the Bow Gas-Works. To many of our readers, however, Mr. Carpenter will be better known on account of the articles he took so great a pleasure in writing for the "JOURNAL," and in which he recounted the results of his practical experience as a gas maker, for the benefit of the younger members of the fraternity.

The death took place last Thursday, at Nieder Walluf, on the Rhine, of Dr. OECHELHAEUSER. The deceased, who was over 80 years of age, was a very active man of business, first as a member of the paper-making firm established by his father, and afterwards as the founder, and for thirty years the Chairman, of the German Continental Gas Company, of Dessau. He was editor of a popular edition of Shakespeare's works, and author of studies on Shakespeare, as well as of numerous essays on economic and commercial subjects. For many years he was a very influential member of the Reichstag and the Prussian Diet. Dr. Oechelhaeuser was in former years as well known to some of the older school of gas engineers in England and America as his son, Herr W. von Oechelhaeuser, is to those of the present day, from his frequent visits to both countries for purposes of investigation, and on account of his contributions (many of which have been translated for the "JOURNAL") to German Societies.

NOTES.

Selection of Gas-Engines.

Some hints as to the points which should be borne in mind in the selection of gas-engines to suit particular requirements, are given by Mr. J. D. Lyon in the "Engineering Record." Steam-engines of certain types have come to be used for special kinds of work; and the author is of opinion that in course of time the various forms of gas-engines will similarly be brought into classes, which will become well known to users. This result will be likely to increase the reliability and enhance the reputation of the gas-engine, especially for use in plants of considerable importance. At the present time, however, almost every builder of gas-engines recommends the engines of his manufacture for power-users of any description; and while it is no doubt true that the engine will furnish power for almost any class of work, the fact remains that each type of engine will be found better adapted for certain kinds. This renders it advisable for persons without mechanical training to secure the services of a competent engineer to aid in the selection of gas-engines. Sharp angles should not be of frequent occurrence in the castings of the engine; and all parts under strain should have large, well-rounded fillets at all such angles. The main bearings should be carefully considered, as the bearings of gas-engines seem to give more trouble than those of steam-engines. They should not only be easily adjustable, but the metal with which they are lined should be so arranged as to render the replacing of the lining easy. The crank-shaft should be heavy enough, and accessibility of working parts should be taken into account. An important point in connection with the valve mechanism is the manner in which the valves are lifted from their seats, especially the exhaust-valve. This lift should be as nearly as possible in a straight line with the axis of the valve stem. The igniter and the combustion chamber should also have careful attention. The latter should be of such form as to present the largest volume with the smallest surface, which should not be broken up by angles and pockets to any great extent.

Mixing Concrete for Monolithic Work.

A fine example ot concrete work is reported in the "Engineering Record" as having been carried out at Truro, Nova Scotia, in the construction of a storm-water drain 3200 feet long, which was laid in a single monolithic mass. The drain was of 27 in., 30 in., and 36 in. bore, with a number of inlets and catch-basins, also of concrete. The roofing of the drain was in brickwork; but the span was only from 124° to 130° of the circle throughout. The example of this work is valuable, as showing a means of cheaply carrying out an extensive operation of the kind in a locality where gravel or other suitable agglomerate is available and brickwork is expensive. For the preparation of the monolithic concrete, the proportions of materials specified were 1 part of cement, 2½ parts of sand, and about 4½ parts of gravel passing a 2-inch screen and retained on the sand screen. The concrete for the foundation work only was mixed 1, 3, and 5 of the same. These proportions were determined by experiment, in order that the mortar might be slightly in excess of the voids in the gravel. The mixing was done as follows: The clean gravel was spread upon a smooth, tight platform, in a movable frame which was to be of the dimensions requisite for holding the proper amount of stone for a batch, in the discretion of the engineer. The gravel was to be levelled off to the top of the frame, and thoroughly wetted. The cement and sand were mixed dry upon an adjacent platform, and uniformly spread upon the top of the stone. The frame was then to be lifted off, and the materials carefully and thoroughly mixed by being turned over with shovels. What additional water was required was sprinkled on the mass, care being taken to avoid washing away any of the light material. The concrete was laid in 6-inch layers and lightly rammed; the usual precautions being taken to join new work to that which had set. The set concrete appears to have been impermeable, as nothing is said about rendering with cement plaster. It is stated, however, that with a little practice the men learnt to lay the concrete so that, when the moulds came away, the surface was as smooth as the planed surface of the boards.

Combination of Concrete and Cement Rendering.

Another way of mixing concrete was followed by Mr. M. A. Neville, the Engineer of the Peoria and Eastern Railway, for a monolithic bridge, which pierces a 68 feet embankment. The concrete for the arch and spandrils was composed of 1 part of cement, 2 parts of sand, and 5 parts of stone broken to pass a 1¼-inch ring; while the mixture for piers, abutments, and wing walls was 1 of cement, 3 of sand, and 6 of stone broken to pass a 2-inch ring, Hand-mixed concrete was required to be made in batches of not more than one cubic yard at a time. The method of measurement of the materials was to be by headless or bottomless barrels, or boxes, or square and uniform-sized wheelbarrows expressly designed for the purpose. The detail-method of hand mixing was to be generally as follows: The proper amount of sand to be measured out and spread upon the mixing platform, and the proper amount of cement placed upon it. These materials were to be turned over dry until evenly mixed, and then wetted and mixed into a rather thin mortar, which was to be spread in an even and thin layer upon the platform. The proper quantity of concrete stone, previously drenched with water, was then spread upon the mortar, and the whole turned over at least twice, either by shovels or hoes, before being loaded into the wheelbarrows. In wetting the mixture of sand and cement to work the mortar, and any necessary final wetting of the mixture of mortar and stone, a spray or sprinkler was to be used. The water was forbidden to be dashed upon the mass in buckets, or by means of a jet. The inspector was directed to insist that the resultant mixture of sand, cement, and stone was as nearly as possible uniform in character; the mortar being equally distributed throughout the mass of stone. He was also to see that the mixture was neither too wet nor too dry. It was to be of such a consistency that, when thoroughly rammed, it would quake slightly; but it was not to be thin enough to quake in the wheelbarrow, or before ramming. Machine-mixed concrete was to be of the same general character and consistency, and never to be made in larger batches than a yard at a time. This work was to be faced with a mixture of 1 part of cement and 2½ parts of sand, an inch thick, but put on inside the frames at the same time as the rest of the concrete was filled in, and all well rammed in place together. No outside plastering was allowed. The arches were built in longitudinal layers, starting simultaneously from each end, and wide enough to constitute a day's work. The layers were not to be more than 6 inches thick. The work on every longitudinal section was to be completed the same night, if necessary.

The Dundee Gas Managership.—A special meeting of the Dundee Town Council was held last Tuesday, to deal with the short list of eight applicants for the post of Gas Manager. The names of the gentlemen before the meeting were: A. M'Leod, Dawsholm, Glasgow; W. Ewing, Greenock; S. Donald, Dundee; W. B. M'Lusky, Perth; A. Yuill, Alloa; J. Kincaid, Falkirk; L. Hislop, Uddingston; J. Webster, Bridgeton, Glasgow; and J. D. Smith, Stirling. The name of A. Waddell, Dunfermline, was added at the meeting. The list was then cut down to five, by each member of Council writing the names of five gentlemen, and signing his list. The five who were selected, and the support they received, were: A. Yuill, 23; J. Kincaid, 21; W. Ewing, 20; S. Donald, 20; and W. B. M'Lusky, 16. These gentlemen are invited to attend a meeting of the Town Council to be held to-day.

The Didier-Stettin System of Inclined Retorts for England.—The Plymouth Gas Company have decided to adopt the well-known Didier system of inclined retorts, and have given instructions to Messrs. Willey and Co., Engineers, of London and Exeter, to proceed immediately with an installation for 1¼ million cubic feet per diem. The scheme includes all the necessary apparatus for treating and measuring this additional quantity of coal gas—purifiers with the new Pickering patent valve, engines and exhausters, station meter, Livesey washer, elevating and conveying machinery, condensers, &c. The Company's Engineer (Mr. Percy Hoyte) has prepared the extensive plans necessary, following closely the model lines of the Imperial Continental Association Gas-Works at Mariendorf, Berlin, which the Chairman and a deputation of the Directors of the Plymouth Gas Company have recently inspected. The Mariendorf installation was fully described and illustrated by Mr. Edward Drory in the "JOURNAL" for June 3 last. The Didier-Stettin system of inclines is extensively adopted in some of the principal cities of the Continent with admirable reported results; but the installation at Plymouth will be the first settings on the principle erected in this country.

COMMUNICATED ARTICLE.

TEMPERATURE AND THE OUTPUT OF GAS-FIRES: IS IT COLDER BEFORE OR AFTER CHRISTMAS?

By (the late) E. W. T. RICHMOND.

[There is a melancholy interest attaching to this article. A short time before the fatal accident to Mr. Richmond, he handed us a rough sketch of it, asking whether we should be prepared to publish it if it was completed. Unfortunately, Mr. Richmond has not been spared to put the finishing touches to the composition; but gathering his views from the notes and the portions he had already roughly drafted, we have endeavoured to put before our readers what he himself intended to present to them. His idea was to have the article ready for publication about the beginning of October—the first month covered by his temperature records; and, as far as possible, we have endeavoured to comply with his wishes.—Ed. J.G.L.]

In the course of the past few months, there have now and again been passing references in the "JOURNAL" to the effect of temperature upon gas consumption; and they have called to mind an inquiry that I made some few years since into this very question of temperature and its effect indirectly on gas consumption, but more directly on the sales of gas-fires. I do not intend to obtrude upon my readers beyond the opening paragraphs the fact that I am a maker of those useful, comfort-promoting adjuncts of a household; and I may be permitted the remark that no one could be more conscious than myself that any advantage which may arise from the discussion of this question of temperature from my point of view will only be shared by me as a unit in the gas-fire industry. But as a unit I am deeply interested in the question; and as suppliers of the fuel used in these appurtenances of the home and the business establishment, gas managers, directorial and professional, have an equal interest. The greater the success of the one supplier, the greater the success of the other. The more fires there are sold, the greater is bound to be—no matter what the temperature in a given winter—the consumption of gas for heating in that winter. Therefore in anything that can be done by the gas-fire makers or the gas suppliers to increase the output, the benefit must be mutual. To this end, the present article is written.

Now in the winter months, one, of course, expects that the demand for gas-fires will be greater than in any other period of the year; and so it is. But, if we take the six months extending from October to March, it is found that, after a respectable start has been made, as the thermometer continues to fall, so does the demand for gas-fires. In other words, a diagrammatic representation of the rises and falls of temperature and of the output of gas-fires would show that, while the line for the latter would steadily ascend with the gradual drop of the line for the former during the first month or two of winter, afterwards, with the further descent of the temperature line, the gas-fire line instead of continuing to ascend would show a break and rapid fall. In the case of most other necessaries to human comfort in the winter, with a snap of cold weather the greater is the demand; but, curiously enough, in the case of gas-fires, there is an inversion of this almost general law—the colder weather which is experienced (as it is the intention of this acticle to prove) after Christmas than before has no effect in causing a boom in the demand for gas-fires. Why this should be so presents a most interesting problem, but such a many-sided one that I for one beg to be excused from fully discussing it. Whatever might be said to account for it would be to a large extent suppositional; and as this is a case in which assumption will not help us so much as fact, we will ignore it, and turn to the consideration of an ascertained condition of things which may be of service to the gas manager and to the gas-fire vendor in bifurcating in a pronounced manner in the coldest months the gas-fire and temperature lines in our hypothetical diagram, instead of permitting them to run collaterally as they now do in those coldest months.

Unrealized Expectations.

As a maker of gas-fires, the phenomenon of which I have spoken in connection with their sales or demand forced itself upon me some few years since; and I then—at first more out of curiosity than anything else—began looking about for a *raison d'être*. I found that my experience was shared by many gas authorities, some of whom, let me say, are in a remarkably good position for placing gas-fires, if consumers can only be induced to take them. While declining to discuss here the question in all its bearings, it may be said that the general conclusion I arrived at was that, among householders there is an impression that, with the turn of the Christmas season, the worst of the winter has been passed, and that any neglected provision for heating need not cause them any further uneasiness in the ensuing months. A greater mistake was never made. When the mistake is realized by the sudden fall of the thermometer, and the good housewife is abruptly surrounded by the tribulations which are inseparable from the coal-fire—the work, grumbling, dust, soot, provision of necessaries, and other unpleasant evils which derange the composure of many members of the house—then it is considered too late to effect the installation of gas-fires, which friends have found so useful, cleanly, and labour-saving, and always ready to defy any sudden fall of temperature. A good resolve is made that before winter sets in again, gas-fires shall be installed. The summer comes; and the resolution gets rapidly pushed back into the utmost recesses of the memory. Winter enters, but the drop in temperature is so gradual that the resolution remains dormant. Christmas passes, and then—to the distress of the housewife—the experiences of the previous year return. So the history of the gas-fire question in the household repeats itself year after year in most cases. Little is done—the gas supplied for heating does not progress at the percentage rate that it ought to do, and the makers of gas-fires do not reap that winter harvest that their goods should yield.

Householders' Mistakes and Procrastination.

Now it is in connection with this question of lower temperatures after Christmas than before that, if I may be permitted to make the suggestion, gas suppliers might do something to rouse negligent consumers into the making of provision, by showing them, through recorded and authentic statistics, that it is a mistaken view to suppose that, with the passing of Christmas, the worst of the winter has been seen and felt. Beyond enabling gas managers to do this, it would ill-become me to suggest that the figures I have obtained will teach them anything. I know full well, that for many years past it has been recognized by the gas profession that a low temperature has more effect in bringing about big gas outputs than any other climatic variations from agreeable conditions. A sudden accession in demand tells them (more often than not) as plainly as Fahrenheit or their own personal feelings could do of a drop in temperature; and therefore they must know, as well as my figures can inform them, of the facts that I now suggest they should bring prominently before householders in their particular districts. The diagrams which the late Mr. Frank Livesey gave to us through the columns of the "JOURNAL" nearly sixteen years ago established the remarkable relationship between temperature and gas consumption; and those diagrams and the accompanying article I studied with considerable interest at the time of my inquiry a few years since.

Gas Suppliers and Negligent Consumers.

But there is another point to which, so far as I have been able to trace, attention has not been called before, in connection with those diagrams; and it is this that, though the consumption of gas is shown to have oscillated with a near approach to exactitude with the temperature—that is to say, as the thermometric indications descended, the consumption ascended, and *vice versâ*—there were, comparatively speaking, few gas-fires in those days to account for the rise in consumption on the fall of temperature, and the drop in consumption on the rise of temperature. Accepting this as true, and I do not think that anyone will gainsay it, then it proves a preference on the part of the public for an easy and handy method of obtaining warmth; and, generally speaking, the handiest thing that they had at the time Mr. Frank Livesey's diagrams were published was the old-fashioned flat-flame gas-burner which they used for lighting. They wanted additional heat; but they did not want the trouble of lighting extra fires. This assumption I base—let it be confessed—on the foundation of personal experience; and my own experience in this respect, I fancy, is that of most other people. But if gas managers will recognize more this natural inclination on the part of their consumers, it may be an incentive to greater industry in endeavouring to place additional gas-fires; the simple fact (as I think it may be called rather than an assumption) offers, indeed, a line of fire that could, I am sure, be used with telling effect.

Consumers Fly to a Handy but Questionable Means of Heating.

Agreeing, then, that consumers fly to gas-burners for obtaining extra heat, what a splendid field of argument it opens up to the gas manager in exploiting the gas-fire. For instance, there are the facts that, as effective agents for the purpose of heating an apartment to a degree of enjoyment and comfort for the occupants, gas-burners are wrongly placed; in the case of flat-flames, they are for the purpose wasteful in the extreme; and are nearly equally so in the case of incandescent gas-burners. The best position for lighting is the worst possible for obtaining a comfortable warmth for the body; and so there can be no two questions as to the course adopted by the gas consumer being the least advantageous. These are only simple arguments—and many others will occur to the gas manager—which may be used; and they arise out of the propensity of the gas consumer to jump at the best available means (albeit improper ones) to obtain warmth when the temperature falls to a provocative degree.

Argumentum ad Judicium.

This brings me back to the original purpose of this article, which is to show first the period of the year when it is coldest, and when one would expect a "boom" in gas-fires; secondly, to give gas suppliers data which can be used to show consumers their mistake in supposing that the coldest of the winter has passed with the end of the year; and, thirdly, to convince them that there is just as much, and even more, reason why they should have gas-fires fixed in January and February as in October, November, or December. Consumers may meet the argument by calling to mind extremes of severe cold before the great annual festival, and of mild weather after. These extremes naturally impress themselves on the mind, and create the uncertainty which it is difficult to remove. But figures which have been obtained

The Coldest Part of Winter.

Mean Values of the Daily Maximum and Minimum Temperatures, and of the Maximum and Minimum combined, for the Months of October, November, December, January, February, and March, derived from Observations extending over Thirty Years, 1871 to 1900, as supplied by the Meteorological Office.

Station.	October.			November.			December.			January.			February.			March.		
	Max. Deg.	Min. Deg.	Mean. Deg.	Max. Deg.	Min. Deg.	Mean. Deg.	Max. Deg.	Min. Deg.	Mean. Deg.	Max. Deg.	Min. Deg.	Mean. Deg.	Max. Deg.	Min. Deg.	Mean. Deg.	Max. Deg.	Min. Deg.	Mean. Deg.
Scotland—																		
Aberdeen	52·5	41·2	46·9	46·6	37·1	41·9	42·4	33·3	37·9	42·1	33·0	37·6	43·2	33 2	38·2	45·8	34·3	40·1
Glasgow	51·8	41·6	46·7	46·4	37·9	42·2	42·7	34·5	38·6	42·3	34·2	38·3	43·1	34 8	39·0	45·5	35·2	40·4
Leith	54·6	41·5	48·0	48·5	37·5	43·0	44·5	31·1	39·3	44·1	33·6	38·9	45·6	33·9	39·8	48·0	34·5	41 3
England—																		
Durham	53·6	40·4	47·0	47·0	36 3	41·7	42·2	32·5	37·4	41·6	31·7	36 7	43·5	32·4	38·0	47·0	33·2	40 1
York	54 6	41·1	47·9	48·0	37·1	42·6	43·0	32·9	37·9	42·6	32·3	37·5	44·6	33·2	38·9	48·4	33·8	41·1
Liverpool	53·8	44·5	49·2	48·3	40·0	44·1	44·2	36·1	40·2	43·3	35·0	39·2	44·5	35·7	40·1	47·1	36·8	42·0
Oxford	55·6	42·1	48·9	48·8	37 9	43·4	43·7	34·0	38 8	42·9	33·3	38·1	45·2	34 3	39 8	49·3	34 6	42·0
Yarmouth	54·5	44·6	49·6	48·0	39·5	43·8	42·7	34·2	38·4	41·3	33·3	37·3	42 5	34·1	38·3	45·3	35·3	40·3
England, South—																		
London	56·8	42·9	49·9	49·8	38·5	44·2	44·7	34·4	39·6	43·8	33·6	38·7	45 8	34 7	40·3	50·1	35·3	42·7
Dover	56·6	46·2	51·4	50·1	41·1	45·6	45·2	36·3	40·8	43·3	35·1	39·2	44·5	35·6	40·1	46 7	36 6	41·7
Southampton	57·6	43·9	50·8	50·5	39·6	45·1	45 5	35 7	40·6	44·3	34·9	39 6	46 5	35 9	41·2	50 4	36 4	43 4
Plymouth	56·9	45·5	51·2	51·7	41·6	46·7	47·9	38 2	43·1	46 5	37 2	41·9	47·7	37·9	42·8	50·0	38·1	44 1
Falmouth	55·9	47·7	51·8	51·4	44·1	47·8	48·2	41·1	44·7	46 8	39·9	43·4	47·4	40·4	43·9	48·6	40 1	44 4
Jersey	58·6	48·9	53·8	52 6	44·4	48·5	48·1	40·1	44·1	46 1	38 4	42 3	47·3	39 0	43·2	49·8	40·0	44·9
Ireland—																		
Armagh	53·1	41·3	47·2	47 7	37·6	42·7	43·5	34·2	38·9	43·3	34·1	38 7	45·1	35·0	40·1	47·6	35·1	41 4
Dublin	54·5	44·2	49·4	49·9	40·9	45·4	46·1	37·3	41·7	45·8	37·3	41·6	47·0	37 9	42·5	49·0	38·2	43·6
Parsonstown	54·7	40·5	47·6	49·4	37·2	43·3	45·5	34·0	39·8	45·2	33·8	39 5	46 9	35·0	41·0	49·8	34·8	42·3
Valencia	56 4	46·3	51·4	52·4	43·0	47·7	50·1	40·6	45·4	49·1	39 9	44 5	49·5	40·4	45·0	50 9	40·1	45·5

direct from, and bear the authority of, the Meteorological Office, cannot safely be disputed by the most obstinate of consumers.

Thirty Winters' Temperature Observations.

When formerly inquiring into the peculiar conditions which attracted my notice some few years since—that almost in the beginning of the coldest three months of the year the ebb-tide of the gas-fire trade had already set in—I obtained from the Meteorological Office, in order to be possessed of definite information on the subject, the recorded observations for the winter months of various well-known towns in England, Scotland, and Ireland, extending over 25 consecutive years from 1871 to 1895. These proved my point; but, my interest being revived in the matter, I have secured from the same source, for the purposes of this article, the maximum, minimum, and mean observations extending over the thirty years to 1900.

Instructive Comparisons.

The table lends itself to many instructive comparisons. Month with month can be compared, town with town, and area with area; and the gas manager who is interested in doing this will find means of usefully applying the lessons that are to be learnt from the analysis. It would, I am afraid, detract from the general interest that this article it is hoped will arouse, if it is burdened with too many comparisons; and therefore I will content myself by drawing attention to the actual differences of temperatures between the closing three months of the year and the first three, in order to give an answer to the question forming the sub-title of this article. It will be remembered that the figures are averages extending over thirty years, which absolves them from depreciatory criticism on the score of casual extremes in the oscillations of temperature records. The variations in temperature from month to month are obvious at a glance, and so space need not be taken up in referring to them.

Aberdeen.

Dealing then with our table in the order in which the records are returned from the Meteorological Office, I have first to take Bonnie Scotland, beginning with grey Aberdeen. The method I am going to adopt to prove the point as to the second half of the winter being colder than the first, is to take the maxima for the first three months, add them together, and divide by three to get the average. Then deal with the maxima for the second three months in similar manner; and subtracting the lower product from the higher, the difference in the maximum average temperatures for the two periods will be obtained. Following this, the minimum and mean temperatures will be treated in the same manner. Thus, for example, in the case of Aberdeen we take the maxima for October, November, and December—

$52·5° + 46·6° + 42·4° = 141·5° \div 3 = 47·1°$, the average.

The maxima for January, February, and March, are—

$42·1° + 43·2° + 45·8° = 131·1° \div 3 = 43·7°$, the average.

Now, subtracting 43·7° from 47·1° shows us that the maximum temperature over the thirty years was 3·4° lower after Christmas than before in the case of Aberdeen. Treating the minimum temperatures in the same way, we again find that the second period, on the average, was colder than the first by 3·7°; and that the mean temperature was 3·6° less. Surely when such facts as these are laid before Aberdonians, they will cease to shiver after Christmas because they have not before the festive day laid on the gas-fires "that cheer, but do not suffocate." In passing, it should be explained that my differences in the mean temperatures are calculated from the figures in the table, and not from the averages obtained by me in dealing with the maximum and minimum temperatures.

From Aberdeen we flit to Scotland's commercial capital; and there we get, from our calculations of the average temperatures of the past thirty years, a peculiar result. Whether we take the maximum, minimum, or mean temperatures,

Glasgow.

it is found that, in all cases, the difference between, on the one hand, October, November, and December, and on the other, January, February, and March, is 3·3°. That is to say, after Christmas, whichever group of figures we take—the maxima, the minima, or the means—the temperature is 3·3° lower after Christmas than before.

From one of Scotland's ports, we now proceed to another—Leith—which will also serve for its beautiful neighbour Edinburgh. Here we find that, in the thirty years, the maximum temperatures show that it is colder by an average

Leith.

of 3·3° in the three months after Christmas than before, the minimum by 3·7°, and the mean by 3·4°. Our friends of the Edinburgh and Leith Gas Commissioners will therefore do well to prevail upon their customers to hire gas-stoves with the New Year "for present comfort and for future good."

Our quest for average temperatures next brings us to Durham, where at the pit's mouth gas for heating must depend more upon its handiness and cleanliness than upon its cheapness. It will even then score a victory. Thirty years'

Durham.

figures disclose to us that the maximum temperatures there are, on the average, 3·6° lower in the first three months of the year than the last three, that the minimum temperatures are 4° lower, and that the means are 3·8° lower.

Alighting next at the old northern capital of York, we ascertain that their experience has been practically the same as that of Durham; the average maximum temperature being 3·3° lower in the quarter after

York.

Christmas than before, the minimum temperatures 3·9° lower, and the means 3·7° lower.

Crossing over to Liverpool, a rather worse state of affairs is found in proof of the point that should be impressed on consumers. There the average maximum temperatures after Christmas are 3·8° below those of the three

Liverpool.

preceding months, the minimum 4·4°, and the mean 4·1°. So that it is the old, old story here that "as the winter days grow longer, the cold grows stronger." Some time since Mr. S. F. Millard, of the Liverpool Gas-Fittings Company, supplied me with a few interesting figures relative to their trade in gas-fires and heating-stoves before and after Christmas; and they showed that of every 100 stoves sold 72 were disposed of before Christmas, and only 28 afterwards, or practically three-fourths of the trade was done in the warmer months of the winter, and only one-fourth during the coldest. This, I have not the slightest doubt, arises from the popular idea that, having once "got over Christmas" without a gas-fire, householders can do without until another winter. The records of Plymouth and Dublin are very similar.

We now descend to Oxford, only to find this seat of learning teaches us the same lesson—that the aver-

Oxford.

age of the maximum records shows that it is 3·5° colder in the first three months of the year than in the preceding three, that the minimum temperatures are 4° lower, and that the means are 3·8° lower.

To make our tour complete, we return to the eastern coast and visit Yarmouth, which shows, next to Dover, the greatest variation of temperature between the months after Christmas and those before of any of the cities or

Yarmouth.

towns in which the thirty years' observations were taken. The maximum temperatures are lower by 5·4°, the minimum by 5·2°, and the mean by 5·3°. When these facts are brought home to East Anglians, we may expect to see a revival of the heating-stove trade in the district at the beginning of the year.

Our great Metropolis has now to receive attention. Nowhere perhaps is the labour-saving gas-fire so essential as in London; and the figures adduced here should be useful in "booming" gas-fires during the coldest months of the year. The temperatures of our thirty winters reveal to us that the average of the maximum readings is 3·9° lower after New Year's Day than before, the minimum observations 4·1° lower, and the mean 4° lower. A word in season should produce an abundant harvest for our Metropolitan Gas Companies.

London.

Travelling to the south-east, it is shown, as already hinted in dealing with Yarmouth, that Dover "takes the palm" for the widest variation of temperature in the periods of comparison. There the average of the maximum temperatures in the first three months of the year are 5·8° lower than in the preceding three, the minimum temperatures 5·5°, and the mean 5·6°.

Dover.

To complete our inquiries in England, we will take a rapid trip along the South Coast, with the result that at Southampton, Plymouth, and Falmouth we get further confirmation, and almost corresponding results, respecting the average lower temperature in the second as compared with the first half of the six months—the differences (for the three towns) being in the maximum temperatures 4·2°, 4·1°, and 4·2°; in the minimum temperatures 4°, 4°, 4·2°; and in the mean temperatures, 4·1°, 4·1°, and 4·2°. I may remark that, of my own knowledge, at Plymouth the gas-fire trade, if not done before Christmas, is undone—a state of things that I hope my figures will help to rectify.

Southampton, Plymouth, and Falmouth.

Before leaving the south, we will just make an excursion over to Jersey to ascertain the condition of the temperatures there. It will perhaps be a matter of surprise to many to find that in at least one respect Jersey and Yarmouth can boast of having something in common—the variation in their temperatures between the first three months over the thirty years and the last three months having a remarkable correspondence. The averages of the maximum temperatures show that it is 5·4° colder after Christmas than before, of the minimum temperatures 5·3°, and of the mean temperatures 5·4°. Our friends across the channel may like to interest their consumers with this fact; and I hope it will be with a beneficial result.

Jersey.

To complete our review of the thirty years, we must pay a rapid visit to the observatories of Ireland; and it is seen that, while there are some large fluctuations in temperature in individual months, there is ground for congratulating our friends on the fact that, taking the averages of the first half of the heating months and the second half, they show a nearer concordance than any other part of the British Isles. They still tell the same tale, however—that it is colder after Christmas than before. Taking Armagh first, the average of the maximum temperatures is lower in the latter half of the six months by 2·8°, the minimum temperatures by 3°, and the mean temperatures by 2·9°. The Dublin differences are very similar—viz., 2·9°, 3°, and 3°. The same with Parsonstown: 2·5°, 2·7°, and 2·6°; but the Isle of Valencia is slightly worse, with differences of 3·1°, 3·2°. and 3·1°. Although, as the figures prove, it is colder after Christmas than before, statistics which I have by me as to the fires fixed in Dublin disclose a remarkable falling off in the output of gas-fires in the colder months of the winter compared with the warmer ones.

The Emerald Isle.

I think that the statistical facts set forth here will prove thoroughly the point that it is colder in the second part of the winter months than in the first. Among my collection of information on the subject, are several interesting cuttings from newspapers, which remind me of the terribly severe weather which we experienced last February. But it is not my desire to make a point of any exceptional year—preferring to base my argument on the authentic figures of a long series of years, which neutralize any extraordinary thermometric readings caused by unusual accessions or diminutions of temperature. I quite recognize that objection may be taken to October being included in calculating the averages. This is not a point of weakness, as then the heating season usually commences in many parts of the country. But if we eliminate October, the table still proves a lower temperature and a longer spell of cold weather after Dec. 31 than before. For my own satisfaction, I have dealt, in the same manner as explained, with the figures for November and December, comparing them with January and February; and even then we get an average lower temperature for the latter months of from 2° to 3°. And the low temperatures continue over the third month after Christmas. Yet the demand for gas-fires drops off after the festive day in a most extraordinary manner! Further, I also recognize that the argument may be advanced against me that the fact that there is a greater demand for gas-fires in the three months preceding Christmas than in the succeeding three months is a clear indication of the prevision of householders. To the extent to which business is done, I agree. But my experience of the gas-stove trade has not convinced me that foresight is a special attribute of gas consumers; and therefore I ask, Should not the accession of colder weather after Christmas have the effect of at least maintaining the ratio of sales, and not permit them to fall to an insignificant point? Besides which, I am not prepared to admit that the gas-fire trade at any part of the winter season is at the level which one should expect it to be at with such average minimum temperatures as those shown in the table. The figures—and their proof of colder weather in the beginning of the year—offer arguments for use in stirring up this branch of the winter's business to the advantage of both gas suppliers and gas-fire makers. It can hardly be supposed that the facts as given here are known to many gas consumers—to the best of my knowledge, they have never before been published or dealt with in this particular manner. Then advertise them, or make use of them in any other suitable way, to accelerate the placing of gas heating stoves. The colder weather of January and February should not freeze effort, but, on the contrary, should incite it and stimulate demand. Gas suppliers should drum it into the ears of gas consumers, or keep it strikingly before their eyes, that it's never too late to fix gas-fires.

In Conclusion.

TECHNICAL RECORD.

MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.

The New Gas-Works at Blackburn.

A Meeting of the above Association was held last Saturday at Blackburn. The first portion of the proceedings consisted of a visit to the new gas-works of the Blackburn Corporation at Greenbank, which had been thrown open for inspection by the courtesy of the Chief Engineer (Mr. S. R. Ogden). The party were conducted through the works by Mr. Harold Davies, the Assistant-Engineer, and were greatly impressed with the up-to-date character of the plant and organization. The present capacity of the works is 1¼ million cubic feet per day. The retort-house plant comprises ten beds of eight inclines, each 20 feet long, and the house is capable of accommodating another bench of like extent. The condensers, washers, and scrubber are in separate sets for dealing with 1½ million cubic feet per day. The tar and liquor well is placed underground, and is of brick and puddle construction, with a capacity of 2000 tons. There are two exhausters, each capable of passing 100,000 cubic feet per hour. The purifiers are six in number, 35 feet square, and 6 feet deep. They are of Green's elevated type, and fitted with bottom discharging doors for the removal of spent material, and elevators and belt conveyors for the filling of the fresh lime and oxide. The station meter is equal to 100,000 cubic feet per hour. The gas passes thence by a separate 18-inch main a distance of more than two miles to the gas-holders. The works are, however, fitted with a 24-inch distributing governor, whereby the town may be supplied with gas from these works direct, instead of from the holder. This is to afford compensation when there is an insufficient supply of gas through the governors at the old works to the portion of the town in which the new works are situated. It may be mentioned that the whole of the elevating and conveying plant at the new works is driven by power derived by gas-engines. The exhausters, pumps, and other engines, as well as the sulphate of ammonia plant, are supplied with steam generated by means of three water-tube boilers, fired by the town's refuse, which is dealt with in a Heenan and Froude patent destructor. The working pressure of these boilers is 125 lbs. per square inch; but this is lowered, by means of a Bailey reducing-valve, to 70 lbs. The coke produced is dealt with entirely by machinery from the drawing of the retorts to the loading into trucks. The outside conveyor is equal to the storing of above 2000 tons of coke, without the aid of manual labour. The contracts for the various portions of the plant were let as follows: Inclined retorts and conveying plant, the New Conveyor Company; sulphate plant, Messrs. C. & W. Walker; purifiers, Messrs. Ashmore, Benson, Pease, and Co.; meter and governors, Messrs. Braddock; exhausters, Messrs. Waller. The works were erected in nine months from the cutting of the first sod, which is believed to be a record in gas-works construction; and an important advantage is that they are accommodated with 1½ miles of railway siding. They were built to replace the old works in Jubilee Street, where the manufacture of dry meters is now carried on, and a handsome stove and fitting show-room has been opened, while the offices constitute a central complaint office for the town. The old and larger works in Addison Street have a capacity of 2 million cubic feet of coal gas, and 1 million cubic feet of carburetted water gas.

The Business Meeting.

At the conclusion of the visit, the members adjourned to the White Bull Hotel for tea, after which a meeting was held in the same room.

A Vote of Sympathy.

The President (Mr. S. E. Halliwell) said it was their duty at this their first meeting since the death of Mr. E. W. T. Richmond to pass a vote of condolence with the widow and family of the deceased. Mr. Richmond was a well-known figure in the gas world; and he was sure they all regretted that his career had been cut short so suddenly, and in so unfortunate a manner.

The members of the Association would remember the cordial and courteous manner in which they were treated when they paid a visit to the Richmond Gas Stove and Meter Company's works some time ago; and now that the head of this large concern had passed away, the least they could do was to record a vote of sympathy with his widow and family.

The proposition was carried in the usual manner.

The Manufacture of Sulphate of Ammonia.

Mr. R. T. Stoddard then read a paper on the above subject, which will be published in due course.

Mr. E. J. Wellens moved that the best thanks of the members be given to Mr. Stoddard for his interesting paper.

The proposal was seconded by Mr. Baxendale, who remarked that the author had dealt with the subject in a very able manner; and he was sure they all appreciated the useful information he had given them.

Mr. Stoddard, in responding, said he was glad they had appreciated his efforts. A good deal more could have been brought forward about the difficulties of manufacture, especially on a large scale, if he had the time to go into it; but he would deal with the matter in more detail in a further paper.

It was decided to postpone the discussion until Mr. Stoddard had presented the supplementary communication.

Thanks to Mr. Ogden.

Mr. Garlick proposed a vote of thanks to Mr. Ogden for allowing them to visit his new works, and to Mr. Davies for the trouble he had taken in conducting them through the various departments, and for the interesting explanations he had given. They had seen several new things during the inspection; and he was certain they had all picked up some useful information.

Mr. Thorp seconded the motion; and it was unanimously carried.

Mr. Davies, in responding, said it had been a source of great pleasure to him to take the members through the works; and if anyone would like to inspect the plant more at leisure at some future time, and would let him know when he was coming, he would be glad to conduct him round.

This concluded the proceedings.

PACIFIC COAST GAS ASSOCIATION.

Annual Meeting in San Francisco.

The Tenth Annual Meeting was held at San Francisco (Cal.) on the 15th and 16th July—the President, Mr. C. E. Burrows, in the chair. It was agreed that a class of associate members should be added to the Association, to consist of companies engaged in the manufacture or sale of gas, who should have the privilege of sending one representative to each meeting and be entitled to all the advantages of active members except voting.

Inaugural Address.

The President commenced his inaugural address with a summary of the previous proceedings of the Association. He said that the gas business in the Pacific Coast States was growing rapidly; the last year's sales showing an increase of 24 per cent. in lighting, and 37 per cent. in fuel gas. With regard to the proposition to form a library and headquarters for the Association, a good start had been made by Messrs. E. C. Jones and L. P. Lowe, which he hoped would be well followed up. He also trusted that the suggestion put forward by his predecessor in the chair last year, for the formation of an Advisory Board, would not be lost sight of. Two years ago, it was thought that acetylene might prove an important competitor; but he was not aware that any undertaking in the district was embarrassed in that direction, or found their business materially interfered with. High-pressure distribution, advertising, and municipal ownership were interesting questions of the day; but he believed no one had proposed a paper on the "promoter," who was always well in evidence among them. He was a believer in State control to a just extent, and would be glad to see a Committee appointed to consider the matter and report at the next meeting. Several of the subjects to be brought before the meeting were passed in review.

The Wrinkle Department.

Mr. G. R. Colquhoun, the Editor of the Wrinkle Department, presented a report, which included several valuable suggestions. An improved fire-basket for melting lead, consisted of a plain cylinder, 20 inches diameter by 2 feet long, resting solidly on the ground. The grate is 6 inches above the bottom; and the air supply to the fuel is admitted through a gutter dug out in the earth under one side, which can be closed just as the lead melts. The lead will be kept hot for hours with very little fuel. A combination meter, reflector, and pendant, consists of a small circular three diaphragm dry meter contained in an ornamental case in the hub of a gaselier. It can be adapted to the prepayment system, and is intended for use in hotels or lodging-houses. A scraper or plough, consisting of a strong wooden frame 3 feet square, shod with steel, drawn by a team of horses, was suggested for filling in main pipe trenches. An elaborate electrical arrangement for enabling the height of holders at distant stations to be indicated at headquarters, over a distance of some miles if necessary, was described in detail. In the case of a length of hydraulic that had settled more than an inch at one end, the difficulty caused by excessive seal was obviated, without throwing the apparatus out of use, by means of sheet-iron sleeves, with slip joints, inserted through the caps on the bridge-pipes, the levels of which could be adjusted as desired. Illustrations of a system of low-pressure air-blasts for burning crude oil under boilers and generators were exhibited. The air-blasts entering are diametrically opposed to each other on opposite sides of a circular furnace, meeting in the centre and assisting the atomization and combustion of the oil. The system was being tried in a Springer setting to assist in heating up the generator; thus enabling coke to be used instead of coal. The burners were above the fuel bed. The result of the opposing current was described as a brilliant star or globe of flame. If used under a boiler, the flame was so concentrated that it did not play upon or touch the bottom.

Fuel Conditions in California.

Mr. J. L. Howard, of San Francisco, read a paper dealing with the subject of "Fuel Conditions in California." There was, however, nothing in it, or in the discussion to which it gave rise, that is of special interest to "Journal" readers.

Gas Advertising.

Mr. E. P. Valentine, the Superintendent of the Capital Gas Company, Sacramento (Cal.), contributed a paper on the above subject. He said there was no business that could not be benefited by advertising, and the concern seemed to prosper best that was freely but judiciously advertised. When one decided to advertise, he had to face the problem of how to get the best results from the lowest possible expenditure. The most prominent and perhaps the most efficient medium was the daily paper. Properly conducted newspaper advertising was a profitable investment; but without liberality and judgment, it was apt to be a mere gambling venture. Cheap, unattractive announcements were passed without notice; but an attractive, and therefore to some extent expensive, advertisement received attention, especially if illustrated. A good authority on the subject advised ample space to secure prominence, and the use of a matter-of-fact conversational style. Another gentleman did not believe in illustrations, but advocated frequent changes and the use of snappy, attractive reading matter. One Editor of a daily newspaper claimed for his medium the advantage of repetition, and that it was a daily interview, cumulative in its results. Another said that, given an article of real merit, and preferably with the element of novelty, the essential feature of economy, whether in cost or labour, should be well brought out. The advertisement should be carefully prepared, made attractive, and kept fresh by frequent change. Speaking from experience, he said it paid to advertise gas for fuel, using a fair sized space for a good display advertisement. He rarely used the same copy twice, but took care to press some one particular feature each time. He also used paragraph advertising with advantage, for making known the risks and dangers attendant upon the use of gasoline. In fact, he thought no energetic sustained campaign could be carried on without utilizing the daily paper. The house-to-house canvass, taken at the proper period of the year, yielded the most gratifying results of any known method. He preferred an efficient canvasser to a demonstrator, especially if backed up by the power to offer some concession. The distribution of circulars, handbooks, and manufacturers' advertising matter by mail or otherwise was an economical and effectual method. A separate show-room distinct from the office was found to be an advantage; also the occasional display of well-cooked viands. Posters in street cars, &c., were a great aid in keeping before the public; and it always paid to provide a stove and gas *gratis* for a well-conducted cooking school. He also believed in high-class demonstrations at intervals. Exhibitions in State or county fairs and industrial expositions were costly; but they often proved a really profitable venture. Lastly, in order to advertise successfully, it was necessary to keep at it continually.

Discussion being invited, Mr. Britton said that advertising was, like most other things, a local proposition, and that the character of the customers and the conditions under which the company were selling controlled the character of the advertising. A common mistake people made was trying to write their own advertisements. Not one in 10,000 was capable of drawing up an intelligible advertisement; and it had been his custom for years to employ professional advertisement writers, who understood how to attract public notice, and would write up novel matter almost daily, possibly appertaining to local or national happenings. Another common mistake was stinginess. There was no money in small cheap advertising; but a good half column in a prominent place would pay. He also believed in separating the show and sales rooms from the business office. The rental of a spacious, well-filled store, with kitchens, bath rooms, &c., for the effective display of samples, would be recovered again and again. No appliance should be fitted without being followed by a demonstrator, who should see that its working was thoroughly understood. Frequently the stove was only partially used, because the user did not understand it, or had but a partial knowledge. Then a little

occasional liberality was a good thing. He had lately offered a special line, with the result that in three days he sold nearly 500 stoves at about £1 13s. each. Perhaps he lost £2 10s. on each stove, or (say) £1000 on the lot. But it was safe to say that each stove brought in a yearly consumption of 12,000 cubic feet of gas; and he challenged anyone to show that, assuming he spent £1000 on the deal, it was really lost or wasted money. He contended that it soon came back, and was a good investment. The great thing indeed was liberality. Bargain sales were a great line in other trades, and could be made so in the gas trade. Another boom he had tried was to offer a stove worth £3, together with £3 worth of gas, for a cash payment of £4. This policy did not check what he might call the legitimate trade, but rather stimulated it. The additional sale of gas was secured without any additional cost for distribution and establishment expenses, and represented an actual profit of about 50 per cent. Care should be taken to put out only thoroughly efficient appliances, even if the cost was more, as an inferior stove was the poorest possible advertisement. He might also add that he was undertaking the care and maintenance of high-power incandescent lamps for a small extra charge—say, 2d. per 1000 cubic feet on the quantity of gas used. Mr. Lowe strongly approved Mr. Britton's scheme. It was a great mistake to give stoves away, or to hire, as the customer did not value a thing he had not paid for; and therefore he thought it good business to get the customer to pay, if only half the cost of the stove. With regard to separating the show-room from the offices, he thought there was something in keeping the two together; so that when a customer called to pay a bill, he should have to pass by an attractive array of appliances. There was something in the bargain line of business, and in the fact that enormous, magnificently managed establishments found the clearing-out sale a good line from time to time. He understood that Mr. Aldrich had been exchanging high-power gas lamps for electric arc lamps; and if that paid, they might go on to consider the expediency of giving a gas-stove in exchange for a coal-stove. His experience was that anything given away was not appreciated; and the man who had a lamp *gratis* expected a supply of mantles, &c., to be thrown in. Mr. Osborne advocated judicious advertising on the backs of the bills. He pointed out that it was no use to get stoves out without taking care that they were used regularly. A stove that did not, on the average, take from 1000 to 2000 cubic feet of gas per month was no use to the company. He also secured the interest of ironmongers and plumbers by allowing a commission on all stoves sold through the trade. Mr. Gutsch questioned whether a steady, even policy, and treating all consumers alike, was not preferable to the bargain and clearance-sale style of business. Mr. Aldrich remarked that the author of the paper, and also some of the speakers, omitted the other half of the business. The calorific value of gas was no doubt important; but he had yet to learn that its illuminating value was a thing of the past. He could not quite follow Mr. Britton's arguments, as it appeared to him that it would be 2½ years before the bare outlay was recouped. He said that gas companies did not run bargain counters, and had no right to sell a thing for less than cost. If the gas was sold at the cheapest rate consistent with a fair profit, there was no margin for giving anything away. He had, however, done something in the way of "bargain days," with the result that his day sales represented over 50 per cent. of the total. The thing was to have a good display; and he ventured to say that his show-rooms at Spokane, which cost £400, were the finest in the States. He believed in professional advertisement writers, but particularly in working up the non-consumers. He had displaced over 200 electric arcs with gas-lamps, and he undertook maintenance, and found that people were willing to pay for it. The business should be run on business principles, pushed and advertised in all legitimate ways, by means of newspapers, circulars, demonstrations, show-rooms, and anything else.

(To be continued.)

American Gaslight Association.—The thirtieth annual meeting of the American Gaslight Association will be held in New York on the 15th to the 17th prox., under the Presidency of Mr. W. R. Beal, of that city. The following papers will be submitted to the meeting: "Some Notes on Cement Masonry," by Mr. I. N. Knapp. "The Care and Maintenance of Incandescent Gas-Burners," by Mr. M'Dougald Dexter. "The Cleaning and Repairing of Gas-Stoves," by Mr. G. S. Clarke. "Gas-Rates and a Franchise Tax," by Mr. G. M'Lean. There will also be several other communications, the exact titles of which have not yet been decided upon. If the papers are of a sufficiently high standard, the Beal medal will be awarded to the author of the best one presented. The officials are endeavouring to arrange for a lecture on some subject of interest to the members, to be delivered during the meeting. In addition to the papers and lecture, the report of the Research Committee will deal with the question of Pipe Standards, and with other subjects which should give rise to a good discussion; and there will also be a report from the Committee on Uniform Accounts. The arrangements for the entertainment of those attending the meeting include a carriage ride and theatre party for the ladies; and for the members a banquet and visits to various gas-works and electric power stations, and if possible an inspection of the underground railway now being constructed in the city.

FERROCYANIDE MANUFACTURE AT THE HAGUE GAS-WORKS.

The following account of a process, which is in practical operation at the Hague Gas-Works, for the production of potassium ferrocyanide (yellow prussiate) from the cyanogen in coal gas, is taken from a paper by Heer J. Rutten in a recent number of our Dutch contemporary "Het Gas."

When the works of the Imperial Continental Gas Association at Amsterdam were taken over by the Municipality, the author was appointed Chemist of the works; and he then became acquainted with a process for the preparation of potassium ferrocyanide, which, though exceedingly simple, did not fulfil requirements in respect of economy. Ferrocyanide production had only been introduced at Amsterdam as an experiment, and there was no well organized chemical procedure. The arrangements at Amsterdam gave him, however, an opportunity of studying the important cyanide extraction question, and spurred him on to investigate it. He soon came to the conclusion that it presented a field of research as yet untrodden. Existing literature gave him no help. According to well-known experimentalists—such as Professor Lewes and Mr. Foulis—gas containing ammonia was unsuitable for wet cyanide recovery. The author, however, discovered, on the contrary, that when the gas, owing to unusual circumstances, was strongly ammoniacal, the production of potassium ferrocyanide did not decrease, but increased. This was to be expected, because in extracting ammonia from gas, a portion of the cyanide (20 per cent., at least) present in the crude gas gets lost. If the washing is less thorough, more cyanide will remain in the gas at the inlet of the scrubber; and this additional cyanide can be fixed in the cyanide extracting apparatus. When tests in the laboratory had clearly shown that ammonia was no obstacle to perfect cyanide extraction, trials were made with the existing cyanide washer, and gas which had not been freed from ammonia was freed from cyanide with the same liquid as that with which the non-ammoniacal gas had been treated. Owing to lack of suitable apparatus, a rational working up of the solution and pressed cake could not be carried out at Amsterdam, and the experiments had to be discontinued.

In 1899, the preparation of potassium ferrocyanide was discussed in the technical journals, and, *inter alia*, the Bueb process was referred to. So much has been already said about this process that a few words here will suffice. Dr. Bueb obtained, as final products after boiling, a pressed cake, which contained the cyanide as insoluble ammonium ferrocyanide, and a lye containing ammonium sulphate. The pressed cake was sold, just like spent oxide of iron, to a certain works; while the lye was mostly worked up on the spot to sulphate of ammonia. But this working up may present a difficulty. The lye is added by degrees to the sulphuric acid in the saturators for the manufacture of sulphate of ammonia; so that the salt is obtained in the cheapest manner. The colour of the sulphate of ammonia so obtained will, however, not be good; and in the artificial manure trade, great attention is paid to this point. Consequently, there ensues a decrease in the value of the sulphate of ammonia produced. It is possible that the lye can be worked up in a better way than by Dr. Bueb's process; but it is improbable. The application of the Bueb process is not feasible in works making concentrated ammoniacal liquor. All the ammonia combined as sulphate would have to be liberated by means of alkali (in the Solvay apparatus, by carbonic acid and caustic soda), and the cost of producing the concentrated liquor would be enormously increased, to say nothing of the greater care which the working up of a liquor with a high and varying proportion of ammonia demands. At the Hague Gas-Works, the ammoniacal liquor is manufactured into concentrated liquor. Consequently, the works were excellently suited to apply the process introduced by the author.

The Hague Gas-Works consist actually of two works—the old and the new. The new works are equipped for cyanide extraction by the wet process; so that about half of all the gas made is purified in this manner. Special purifying-houses serve: (A) for sulphuretted hydrogen and cyanogen purification, and (B) for sulphuretted hydrogen purification. Thus, in the old works, bog iron ore containing Prussian blue is obtained; while in the new works the bog ore is free from blue. The ferrocyanide factory itself is so arranged that the lyes, &c., obtained by the wet purification of all the coal gas produced can be worked up by the addition of single sets of apparatus. Without these, the capacity could be nearly doubled by introducing night work. After the gas has passed the Pelouze tar-extractor, it enters the washer-scrubber, on the Kirkham system. This has a capacity of 2,118,000 cubic feet, and is arranged as for the Bueb process. It has seven chambers, of which the first two serve for the removal of naphthalene from the gas, and the other five for cyanide purification. The liquids are pumped from one chamber to the other. When the cyanide chamber No. 1 is saturated, the contents are pumped away to the concrete tank for lye, shown in the section fig. 1 (p. 880). Cyanide chamber No. 2 is then pumped into No. 1, No. 3 into No. 2, and so on. Chamber No. 5 contains a stirring arrangement, which is unnecessary for the present purpose. The gas, freed from naphthalene and cyanogen, passes next to the purifying-house, where it is mixed with the water gas

The pipe connections are shown thus:

a Steam Pipe.
b Exhaust Pipe.
c Water Service.
d Lye Pipe.
e Ammonia Pipe.
f Vacuum Pipe.
g Condensed Water Pipe.
h Suction and Pressure Pipe.
i Cooling Water Pipe.
k Sewer.

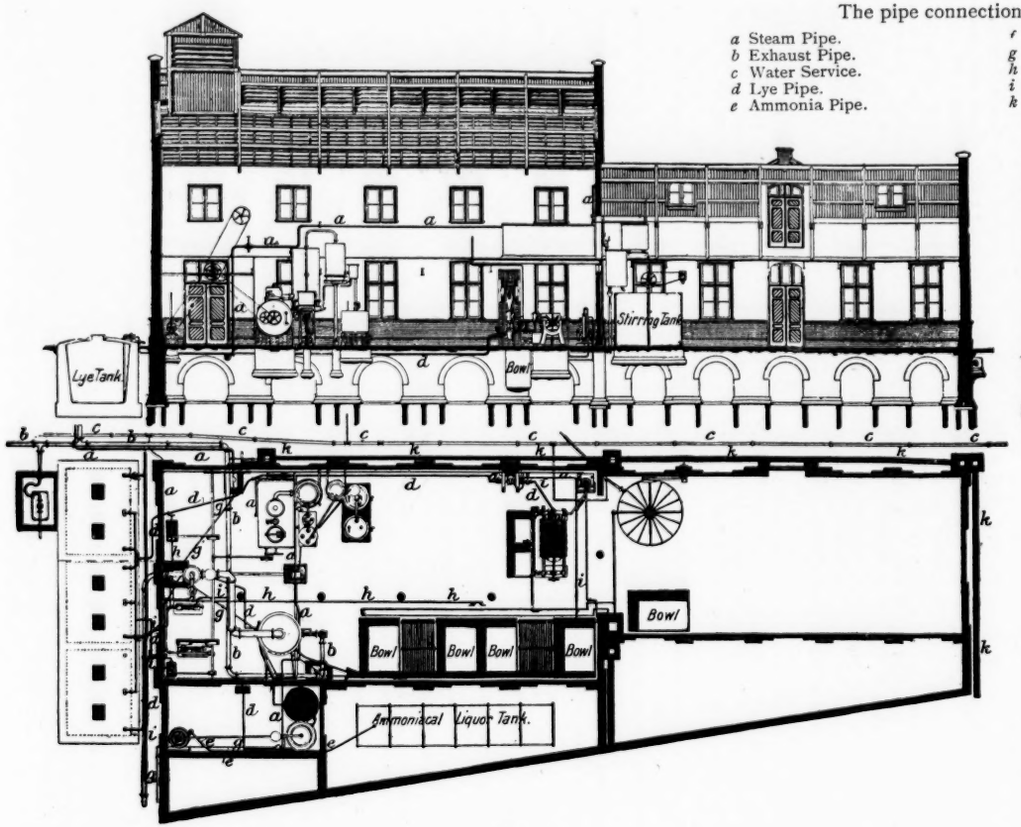

FIG. 1.

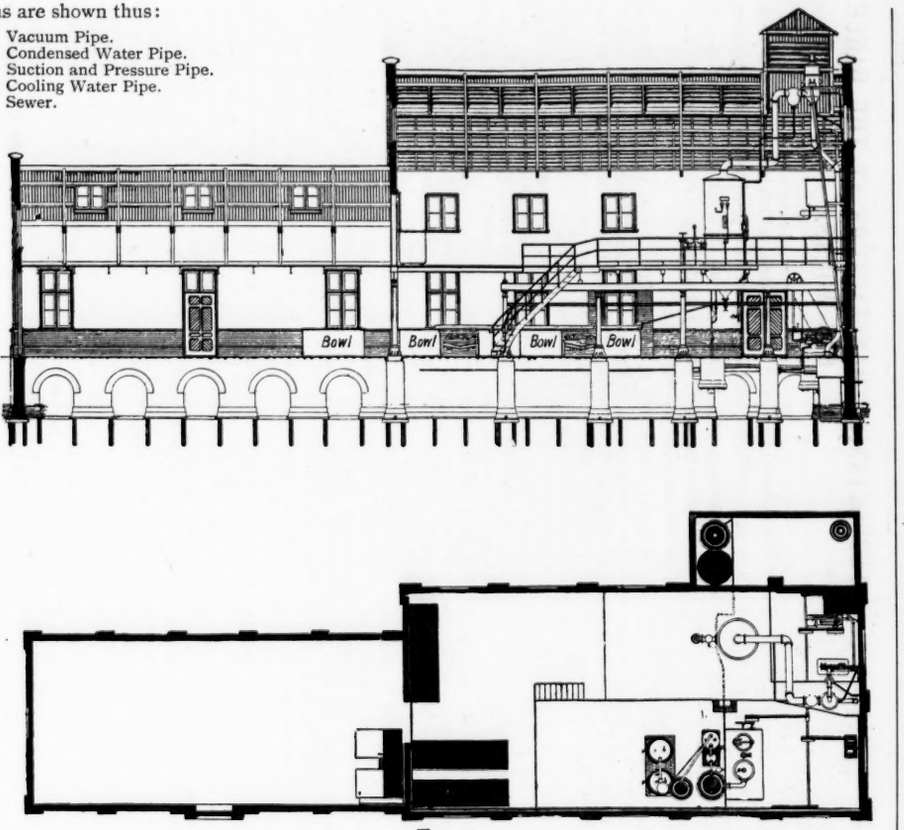

FIG. 2.

and pursues its ordinary course. It may be observed that the naphthalene extraction takes place by means of anthracene oil as recommended by Dr. Bueb, and the system works well, as is shown by the number of obstructions having decreased. It is a great advantage that the gas consumers are thus relieved of the nuisance of blowing out the services; and this counterbances the necessarily increased cost of this method of purification.

The following operations are carried out in the potassium ferrocyanide factory and in the washer house:

1.—Making basic ferrous carbonate and washer lye.
2.—Running the chambers of the washer empty, and refilling them.
3.—Separating the lye and precipitate.
4.—Recovering the ammonia present in the lye.
5.—Evaporating the lye after it has been freed from ammonia, and crystallizing the evaporated lye.
6.—Working up the pressed cake containing cyanogen and ammonia.

As products there are obtained:

(A)—Concentrated ammoniacal liquor, containing 15 to 20 per cent. of ammonia, chiefly combined with carbonic acid and sulphuretted hydrogen.
(B)—Liquor ammoniæ, containing about 25 per cent. of ammonia.
(C)—Potassium ferrocyanide (99 per cent.).

As bye-products, there are obtained:

(A)—Solution of soduim sulphate.
(B)—The gases given off from the distillation of the ammonia.
(C)—Over-oxidized or decomposed pressed cake.

The preparation of ferrous carbonate and washer lye takes place in the building shown in the right of section fig. 1, the chief use of which, however, is to store the chemicals required in the business—viz., iron sulphate, carbonate of soda, carbonate of potash, and caustic potash. On the loft floor, there are two iron bowls, each holding 220 gallons; while a third bowl, holding about 480 gallons, projects just over the loft floor. The two first-named bowls are for dissolving carbonate of soda and iron sulphate. The hot solutions are drawn off into the third bowl, stirred, and left to stand. Basic ferrous carbonate is produced as a greenish white mass, after a portion of the carbonic acid has escaped with violent effervescence. The supernatant lye must now be separated from the precipitate, and the latter washed, which is done in the following simple manner. In the middle of the bottom of the bowl, a stuffing-box is fixed, through which a pipe, turned smooth on the lathe, can move up and down. This movement is effected by a screw and worm. A tap is fixed to the pipe underneath.

When the precipitate is being prepared, the pipe is first of all turned up as high as possible, and the tap closed (the open end of the pipe is at about half the height of the liquid). When the precipitate is ready, the tap in the pipe underneath is opened, and the lye, containing sulphate of soda, begins to run off. By lowering the pipe, the lye can be entirely tapped off above the precipitate, without loss. The pipe is again turned up, the tap is closed, water is run into the bowl, stirred, and again left to stand.

The washing of the ferrous carbonate is continued till there is no longer any noticeable sulphate reaction. The bowls have capacities of 242 gallons and 480 gallons. Therefore about 1320 lbs. of iron sulphate and about 606 lbs. of soda can be operated upon at the same time. This quantity is sufficient for 660 to 1320 gallons of washing liquid, and, after the addition of 660 to 1320 lbs. of carbonate of soda, is fit for use as cyanide fixing liquid. Precipitate, water, and carbonate of potash are mixed in a mixing apparatus (shown in the section fig. 1, farthest on the right). It may be remarked that all motive power is obtained from the engine which drives the washer-scrubber, and that the heating of the water for dissolving the salts is effected with live steam, which is blown into the liquids through silent heaters. The prepared washing liquid is next run off into a mixing-vessel, placed under ground near the cyanide washer. The pump for filling the washer is connected to this mixing-vessel. As already stated, the worked-off lye is run into a concrete vessel, placed near the cyanide factory and divided by partitions into three compartments, each holding from 2640 to 2860 gallons. The concrete vessel is lined inside with a special preparation of lac, which prevents the action of the alkalis on the cement. It had first to be ascertained by laboratory tests that such a lac would give sufficient protection, as no data could be obtained respecting the durability of concrete vessels used for keeping lye. Other materials tried did not give such satisfaction as the lac preparation, with which the results obtained up to the present are very favourable. The concrete vessel is closed with a covering of concrete, in which are the necessary manholes and holes for the passage of pipes.

When one compartment of the vessel is filled with washer lye, the liquid coming from the washer is run into another compartment, while compartment No. 1 is allowed to stand at rest in order to give the precipitate of iron sulphide, ferrocyanide of ammonia, and Prussian blue an opportunity to settle out. The clear lye which remains on top of the precipitate, and contains, among other things, potassium carbonate, ammonium sulphate, ammonium carbonate, ammonia, potassium ferrocyanide, and traces of impurities, can be pumped up to an iron bowl (section fig. 2 on the right at the top), from which it passes to an ammonia extraction apparatus. As the lye contains on an average 4 to 5 per cent. of ammonia, an ordinary Feldmann apparatus cannot be used. An apparatus with several columns was specially supplied by Dr. Feldmann, and was erected in a side building, as that part of the manufacture might give rise to odours, which it was desirable to avoid in the other parts of the works. The ammonia coming from the clear lye is condensed in a condenser, and with steam supplied to it produces a concentrated ammoniacal liquor containing 15 to 20 per cent. of ammonia, which is sold to the firm of Solvay and Co. There forms in the clear lye, when the ammonia is driven off, a little precipitate containing cyanide, which is retained by filtration. In general, the filtration can be carried out with a filter press or with a suction filter. In the present case, a suction filter was chosen, as suction power was at disposal, and, moreover, such a filter requires less attention.

The appliances used on a small scale in the laboratory for filtering precipitates under a partial vacuum were imitated on a larger scale in the following manner. On a cast-iron pan, a perforated lid with a raised edge was placed. A cloth was laid on the perforated lid and fastened air-tight between the raised edge and the lid; while the lid could also be fastened hermetically on the pan. The liquid, running out of the ammonia apparatus, passed into the space formed by the edge and the lid and was drawn through the cloth into the pan after the air in the pan had been attenuated by partly sucking out the liquid in it. The clear lye ran into the pan, and was drawn up to the vacuum evaporating apparatus, placed in the gallery (see section fig. 2), in which apparatus about 880 gallons of water could be evaporated in ten hours. The heating or steam space of the apparatus was made of steel; the other parts of cast iron. The evaporator alone weighs about seven tons; so that the gallery, which was built for two such pieces of apparatus, had to be of special construction. The apparatus is on the Kaufmann system, and works with a dry air-pump, which can create a vacuum of, on an average, 2650 cubic feet. The lye is steamed with exhaust steam, which comes from various pumps and engines near the potassium ferrocyanide works, and was formerly wasted. This steam is now utilized. It also serves for the preheating of the boiler water for the works' boilers (Babcock and Wilcox).

The lye, according to its degree of concentration, begins to boil at between 77° and 95° Fahr. The steam developed passes through a wide pipe to the condenser; having first passed a spray collector, which retains particles of lye. Into this condenser, canal water is pumped by a Worthington pump (1100 gallons per hour) to condense the steam. The cooling water runs off through a 6-inch pipe, about 36 feet long, to a well in connection with the canal. As there is a vacuum in the whole apparatus, it is necessary that the difference in height between the condenser and the surface of the water in the well should amount to at least as much as the maximum attenuation of the air to be attained, expressed in feet of water.

When the lye has been sufficiently steamed, which is indicated by the formation of a slight deposit of crystals, it is run off into iron bowls (plan fig. 1 and section fig. 2), in which it crystallizes further. If the apparatus has to work night and day, the lye production can be simplified, by having an arrangement to the vacuum apparatus for continuously removing the salt. It is thus possible to steam the lye longer and to obtain dry salt directly. Under the conditions which prevail at the Hague at present, however, the lye, after crystallization, has to be steamed again. Finally, a lye remains containing little potassium ferrocyanide and a lot of potassium carbonate. It is then used for preparing fresh washing liquid.

The salt obtained on crystallization is drawn out on dry scoops, the bottoms of which consist of laths placed close together. The lye which drips off is collected in cement tubs and worked up again. The crude salt which has separated out is taken to the gallery, and there dissolved in boiling water in steel bowls of about 660 gallons capacity. When the concentration has been carried far enough, laths are laid across these bowls, and small cords are attached, weighted from below to make them hang vertically. The salt begins to deposit itself on these cords in the well-known large crystals, so that, by a favourable arrangement, it is possible to get nearly all the salt on the cords and very little on the sides of the bowls. Up to the present, the making of potassium ferrocyanide from the lye taken from the cyanogen washer has been spoken of. Besides the lye, there is the precipitate, which contains, in addition to iron sulphide, chiefly ammonium, ferrocyanide and Prussian blue. It is now possible to modify the cyanide extraction according to this process so that absolutely no cyanide remains in the pressed cake. The minimum percentage of cyanide obtained, when reckoned as potassium ferrocyanide, has been 2 per cent. on the wet mass; the maximum has been 40 per cent.

From the manufacturing standpoint, it appears most desirable to approach as nearly as possible to the maximum. It is unprofitable to manufacture pressed cake with less than 5 per cent. of potassium ferrocyanide or its equivalent. The quantity of steam necessary for the manufacture would be too large in relation to the small yield of potassium ferrocyanide, especially at the present low prices. Meanwhile the type of washer that is used requires consideration, as it has been discovered that an extraction liquid with a fixed viscosity is certainly suitable for the one type of washer, but not for the other. This circumstance must not be lost sight of, as the whole of the operations can be affected thereby.

The pressed cake is obtained by filter pressing the thick mass which remains after the clear lye has been pumped off. The filter pressing demands skill on the part of the workman, as the precipitate is so fine that, by pressing too quickly, the cloths immediately lose their percolating capacity, owing to the precipitate being pressed between the filaments. The filter-press, with the vertical force pump and suction pump, is shown in section fig. 1. The lye which runs off is collected in cast-iron bowls, and can be pumped through the ordinary suction and pressure pipes to any point of the factory, or to one of the three lye chambers. For the transference of the lye, two rotary pumps are used, acting on the main driving axle, which, as already stated, is actuated by the engine which drives the washer. This saves much time, as it renders the use of auxiliary pipes unnecessary. The pressed cake obtained is enclosed in a boiler of 1320 gallons capacity, with caustic potash, which liberates the ammonia, while potassium ferrocyanide is formed. The boiler is provided with a stirring apparatus, a steam cover for heating, a steam dome, safety-valve, gauge-glass, manhole, two inlet taps for liquid, and an outlet tap for the thick sludge. The ammoniacal gases evolved are passed through a reflux or concentrating condenser, two wash-pots, and a second rectifying condenser, in order to be afterwards dissolved to form chemically pure liquid ammonia, in distilled water. When the boiler has been filled with pressed cake and dilute caustic potash, the further manufacture requires scarcely any attention; so that one man only can undertake the management of the ammonia distillation apparatus, the suction filter, the evaporator, and the recovery apparatus.

There is no obstruction to the ammonia gas; pressures of more than 20 inches of water should not occur, and would point to stoppages. Liquid ammonia is an expensive product, which is difficult to sell, and therefore troublesome to deal with. The smallest impurity, moreover, gives rise to brown coloration, so that, *inter alia*, the closing of the containing bottles must be carried out with care. After the pressed cake has been taken out, the mass is filter pressed, and the lye obtained is again enclosed with fresh pressed cake, until sufficient potassium ferrocyanide is obtained to commence the steaming. All lyes resulting from this part of the process are kept separate for the sake of economy, as they always do service again. The pressed cake taken out can be again used for fresh washing liquid, if the mass has not been too strongly oxidized. A number of other methods for the decomposition of the pressed cake can be employed. The one described is, however, the simplest, though admittedly not the cheapest.

Decomposition by lime, which yields a soluble calcium-ferrocyanide, and treatment of the solution with chloride of lime, which produces a not readily soluble calcium-potassium ferrocyanide—which, with the potassium carbonate, gives a nearly

insoluble calcium-carbonate-potassium-ferrocyanide—can only be applied by workmen familiar with chemical manipulations. This method also demands much space. Experiments are still in progress with a view to obtaining a good result by other methods of decomposition. Particulars, however, cannot be given now. The direct working up of ammonium ferro-cyanide into potassium-sodium cyanide need not be considered for small factories.

As regards the consumption of chemicals, there are at present required per pound of potassium ferrocyanide: 2 lbs. of sulphate of iron, 0·9 lb. of sodium carbonate, 0·67 lb. of potassium carbonate, and 0·45 lb. of caustic potash. These figures are taken from the first three monthly rough balance-sheets. As, however, during the first weeks of working a heavy loss occurred from different causes, the potash figures should be much more favourable, and might more nearly approach the theoretical. At first, four men were kept at the work; but it can now be conveniently done by three, owing to the necessary experience having been obtained. There would thus be paid in weekly wages 56s. to 64s., which works out at rather less than ¼d. per pound of potassium ferrocyanide. The chemical supervision can be gradually reduced and combined with other work.

It was expected that 353 million cubic feet of gas would give 108,045 lbs. of salt. As, according to analysis, the proportion of cyanogen in the gas averaged 4·9 oz. per 1000 cubic feet (reckoned as potassium ferrocyanide), this assumption should not be far from the truth. The product obtained is beautifully crystallized, and is dark canary in colour; while the crystals are quickly formed and not contaminated with sulphate.

The author is of opinion that the process described is suitable for works producing not less than 212 million cubic feet of gas per annum. Smaller ones can only work as far as the pressed cake, either according to Bueb's process, or according to another process not yet described, which the author hopes shortly to report on. Many difficulties had to be overcome on the introduction of the process; but owing to the great interest taken in the installation by Heer Bakhuis, the Manager of the Hague Gas-Works, the difficulties were successfully surmounted, and the process goes on as described.

THE CONSTRUCTION OF GAS-COOKERS.

In view of the high efficiency of the gas cooking and heating apparatus produced at the workshops of the German Continental Gas Company at Dessau, the following observations, from a paper read by Herr Schöne, of Dessau, before the Rhenish and Westphalian Gas Engineers at Cologne, will be of interest.

In lectures given recently in various large towns on cooking by electric current, it was stated that the quantity of gas required to bring 1 litre of water to the boil was variable, or dependent on particular circumstances. Looking more closely into this statement, and bringing different quantities of water—*e.g.*, ⅛, ¼, ½, and 1 litre—from a temperature of 59° Fahr. to the boiling point by means of a perfectly good bunsen burner, it was found that, with a small flame, consuming 1·1 cubic foot of gas per hour, there was required for boiling

⅛	litre water in	9	minutes	0·167	cubic feet of gas		
¼	,,	,, 20	,,	0·370	,,	,,	
½	,,	,, 44	,,	0·810	,,	,,	
1	,,	,, 92	,,	1·700	,,	,,	

Or for

⅛	,,	,, 9	,,	1·330	,,	,,	
¼	,,	,, 20	,,	1·480	,,	,,	
½	,,	,, 44	,,	1·620	,,	,,	
1	,,	,, 92	,,	1·700	,,	,,	

Therefore the consumption of gas was different with one and the same sized flame; and while maintaining a certain relation between the size of the flame and the quantity of water, a considerable saving in gas could be effected.

On using a larger flame, consuming 4·4 cubic feet of gas per hour, there was required for boiling

⅛	litre of water in	2¼	minutes	0·165	cubic feet of gas		
¼	,,	,, 4½	,,	0·330	,,	,,	
½	,,	,, 9	,,	0·660	,,	,,	
1	,,	,, 16	,,	1·174	,,	,,	

Or for

⅛	,,	,, 2¼	,,	1·320	,,	,,	
¼	,,	,, 4½	,,	1·321	,,	,,	
½	,,	,, 9	,,	1·321	,,	,,	
1	,,	,, 16	,,	1·174	,,	,,	

It follows from this that the size of the trial flame for bringing to the boil a whole litre of water was chosen exactly suitable; while with the other quantities of water, gas was wasted. It was also of importance that the exact quantity of air required should be admitted to the burner. Likewise the firing-back of the flame into the burner, caused by lighting the flame too soon or by a strong draught, had to be avoided, as, apart from the bad smell caused, waste of gas and injury to the burner resulted therefrom. The open gas cooking-stoves generally in use up to the present are simply quick water heaters, and do not fulfil the requirements of a household—viz.: (1) The power of cooking food slowly and in earthenware dishes; (2) that burning of the food must be avoided, without particular attention to the stove being necessary; (3) it must be possible to expose the dishes to a less or greater heat, according as they are ready, or still cooking; and (4) the possibility of using as many dishes as necessary without having a flame for each.

A cooking-stove with pre-heated air, as made at Dessau, fulfils the foregoing requirements in all respects, and in many cases is a substitute for the usual coal-range. In those towns in which this apparatus has been introduced, a considerable rise in the consumption of gas for cooking has been observed. Therefore, in the interest of the gas-works as well as of the public, the advantages and cheapness of cooking by gas should be pointed out. In this burner, the greatest possible use is made of the economically produced heat by spreading it over a large surface, and utilizing that lost by downward radiation for warming the air for combustion, and so reducing the loss to a minimum.

To promote the absorption and emission of heat by the plates, they are made ribbed on the underside. Experiments have shown that the passage of heat through ribbed plates is about 30 per cent. greater than through smooth ones. Of course, the advantage of spreading the heat over a large surface only comes in when a number of dishes are used. While cooking is proceeding, the vacant places on the cooking-plate should be used for heating the water for washing up. A family previously using a four-hole cooker during the summer months, found a saving of about 40 per cent. by employing a cooking-plate with air pre-heated, which speaks well for the good construction of the latter.

Experiments have shown that a round opening for the gas at the burner ring is by far the best. With right-angled openings, the flames burn feebly, and the gas and air are badly mixed. Moreover, by supplying heated secondary air, much greater heat is developed. This improvement also lessens the possibility of the flame striking back; while the proportion of air to gas in the burner-tube can be greater than before.

Another circumstance of the greatest importance in the action of a gas cooking-plate is that the products of combustion should pass away unhindered symmetrically from the source of heat, thereby presenting the greatest heating surface. If these products pass away on one side, the least advantageous heating surface is given. When the burner is not central, moreover, in order to avoid a smell, the cooking-plates have to be bored through at the outer edge—admitting cold air, and increasing the consumption of gas.

THE TOXICITY OF WATER GAS.

At the recent Meeting of Dutch Gas Engineers at Hilversum, Heer W. Niermeijer, of Arnheim, presented a paper in which he discussed the question whether the high proportion of carbonic oxide in water gas is the only cause of its highly poisonous properties. The following is an abstract translation of the paper, which has been published in "Het Gas."

Shortly before the water-gas plant at Arnheim started working, an accident occurred at Watergraafsmeer; and a little later—*i.e.*, the day before the water-gas plant was started—a serious case of gas poisoning happened in Arnheim itself. It was, of course, at once asserted that this was due to the water gas. The author was requested to express his opinions on the point, and, in consequence, his ideas on the poisonousness of water gas began to assume more definite shape. On considering the following table, which gives an insight into the theoretical composition of gaseous mixtures containing various percentages of water gas, it will be seen that the proportion of the dreaded carbonic oxide certainly increases with the proportion of water gas; but at the same time the percentage of other constituents, also very poisonous—*e.g.*, saturated and unsaturated hydrocarbons—diminishes.

—	Pure Coal Gas.	10 per Cent. of Water Gas.	20 per Cent. of Water Gas.	30 per Cent. of Water Gas.	40 per Cent. of Water Gas.	50 per Cent. of Water Gas.	Pure Water Gas.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Carbonic acid	1	1·4	1·8	2·2	2·6	3·0	5
Oxygen	1	1·1	1·2	1·3	1 4	1·5	2
Carbonic oxide	8	11·2	14·4	17·6	20 8	24·0	40
Hydrogen	41	41·6	42·2	42·8	43·4	44·0	47
Unsaturated hydrocarbons	4	3·6	3·2	2·8	2·4	2·0	—
Saturated hydrocarbons	39	35·1	31·2	27·3	23·4	19·5	—
Nitrogen	6	6·0	6·0	6·0	6·0	6·0	6
	100	100	100	100	100	100	100

In order to represent the influences of the different components by figures, and thus make them easy of comparison, the various gases have been assigned figures which approximately express their relative degrees of toxicity.

Some constituents of coal and water gas are not poisonous; but on mixing with atmospheric air they diminish the percentage of oxygen in it. This is not in itself dangerous; but the carbonic oxide at the same time acts as a poison, for air rich in oxygen is the best antidote to carbonic oxide poisoning. The gases which are not poisonous, but diminish the percentage of oxygen in the

air, are: Hydrogen, carbonic acid, and nitrogen; and they are allotted the figure 1 in the scale of toxicity. The poisonous gases—viz., the saturated hydrocarbons, the unsaturated hydrocarbons, and carbonic oxide—will then have the numbers 10, 12, and 100 respectively in the scale. The following table then shows the comparative degree of toxicity of the gaseous mixtures in the preceding table.

—	Pure Coal Gas.	10 per Cent. Water Gas.	20 per Cent. Water Gas.	30 per Cent. Water Gas.	40 per Cent. Water Gas.	50 per Cent. Water Gas.	Pure Water Gas.
Carbonic acid	1	1·4	1·8	2·2	2·6	3	5
Oxygen	—	—	—	—	—	—	—
Carbonic oxide	800	1120	1440	1760	2080	2400	4000
Hydrogen	41	41·6	42·2	42·8	43·4	44	47
Unsaturated hydrocarbons	48	43·2	38·4	33·6	28·8	24	—
Saturated hydrocarbons .	390	351	312	273	234	195	—
Nitrogen	6	6	6	6	6	6	6
Relative toxicity . .	1286	1563·2	1840·4	2117·6	2394·8	2672	4058

The relative figures to be allotted cannot be fixed exactly. But those given represent the relations fairly well; while even a considerable deviation will not much affect the final conclusion. It will be seen from the second table that, with an admixture of 50 per cent. of water gas (which raises the proportion of carbonic oxide from 8 to 24 per cent., or trebles it), the toxicity rises from 1286 to 2672, or is doubled. Pure water gas, containing five times as much carbonic oxide as coal gas, is only three times as poisonous as the latter. The danger, therefore, does not increase so fast as the proportion of carbonic oxide would imply. It is, of course, indisputable that when any one has been rendered insensible by coal gas to such a degree that he is only kept alive with difficulty, he would certainly have succumbed in a mixture containing 50 per cent. of water gas. But this conclusion should not lead to the use of water gas being restricted; for, by parity of reasoning, all gas-works should have been closed after the first accident with pure coal gas, since the step from no danger to that represented by the number 1286 is much greater than from 1286 to 2672. On passing from *nil* to 1286, people must get accustomed to the danger, and get acquainted with the precautions requisite in use, which is no longer the case on passing from 1286 to 2672.

In England and on the Continent, the great employment of water gas has not been followed by any increase in deaths by gas poisoning. This is explained by the fact that the users, knowing that they are dealing with a more dangerous gas than coal gas, are much more careful than formerly, when people had become accustomed to coal gas, which, moreover, is by no means harmless. An increase in danger may thus have its good points. An increase in the percentage of water gas will only be able to exercise a harmful influence in the event of accident. Against this, however, must be set the fact that its use under ordinary circumstances presents hygienic advantages. Fortunately the two sets of circumstances stand perhaps to one another as 10 millions to 1, or even more; so that the normal circumstances should thus be given more weight. It is well known that, on combustion, coal gas as well as water gas forms chiefly carbonic acid and water vapour. The latter is harmless; but the carbonic acid betrays itself, in badly ventilated apartments, by congestion, cold feet, and other symptoms of carbonic acid poisoning.

How do the products of combustion of coal and water gas and of different mixtures of them behave? Referring to the first table, the gases which yield carbonic acid on combustion are carbonic oxide and the unsaturated and saturated hydrocarbons. One volume of these gases respectively yields 1, 3, and 1 volumes of carbonic acid. Then the production of carbonic acid per 100 volumes of gas will be as shown in the following table :—

—	Pure Coal Gas.	10 per Cent. of Water Gas.	20 per Cent. of Water Gas.	30 per Cent. of Water Gas.	40 per Cent. of Water Gas.	50 per Cent. of Water Gas.	Pure Water Gas.
Carbonic acid	1·0	1·4	1·8	2·2	2·6	3·0	5·0
Carbonic oxide	8·0	11·2	14·4	17·6	20·8	24·0	40·0
Unsaturated hydrocarbons	12·0	10·8	9·6	8·4	7·2	6·0	—
Saturated hydrocarbons .	39·0	35·1	31·2	27·3	23·4	19·5	—
Total carbonic acid .	60·0	58·5	57·0	55·5	54·0	52·5	45·0

It has, of course, been assumed that simple and not carburetted water gas has been used. It will be seen that an addition of 50 per cent. of water gas to coal gas diminishes the production of carbonic acid by 12·5 per cent. The same argument applies to sulphur, of which water gas contains only about one-tenth as much as coal gas. Consequently, an admixture of water gas reduces the sulphur nuisance. Hence, as hygienic advantages accrue from the admixture of water gas, the greater danger which attends it in the case of accident may be considered of little importance.

The Coventry City Council last Tuesday adopted Keith's system of incandescent gas lighting for the Market Hall, Fish Market, and Arcade.

REGISTER OF PATENTS.

Treating Furnace Gases or Producer Gases for the Recovery of Ammonia and Tar.—Rigby, T., of St. Helens. No. 20,716; Oct. 16, 1901.

The patentee describes a method for cooling gases in connection with ammonia-recovery gas-plants, having for its object a direct production of sulphate of ammonia in circulated ammoniacal liquor, consisting in passing hot gases in intimate contact with cool water moving in the opposite direction in a closed receptacle, so as to cool the gases to a temperature of from 30° C to 70° C. previous to their entrance into an acid-tower or ammonia absorbing chamber.

Production of Gas.—Hughes, G. H., of Queen Victoria Street, E.C. No. 21,356; Oct. 24, 1901.

This invention relates more especially to the production of gas from mineral or animal oil, grease, or other like substance; and it has particular reference to the construction of the baffles within the retorts employed. According to one method of carrying out the invention, a reservoir is provided containing the substance from which the gas is to be obtained; the oil being conducted from its reservoir by pipes to a series of retorts arranged in a furnace common to all the retorts. Each retort preferably takes the form of a cylinder placed horizontally in the furnace; and within this cylinder baffles are mounted. The feed end of each retort is closed, and the baffles are so mounted that they may be readily removed from the retort for the purpose of cleaning. The delivery end of the retort is closed by a detachable cover, so that access may be had to the interior for removing the baffles.

Adjustable Gas-Taps.—Bartlett, F. G., of Bristol. No, 26,402; Dec. 27, 1901.

In a gas-tap made in accordance with this invention, the plug (with the gas-way through it) has a range of movement limited, as regards one end of the range, by the usual stop arrangement, and, as regards the other end, by a stop which is adjustable, and which, accordingly, permits of variation of position of the limit it constitutes. The provision of such adjustable stop constitutes the invention. Complete cut-off of the gas supply through the tap is effected, as heretofore, by turning the plug to the permanent limit of its range, as provided by the usual stop arrangement. In the reverse direction, the plug can be turned until stopped by the adjustable stop, which prevents the gas from being wholly cut off by the turning of the plug to the adjustable stop. The extent of gas-way open, and therefore the supply of gas passing through the tap when the plug is stopped by the adjustable stop, depends on the position to which the latter is adjusted and set. Reference to this arrangement of tap was made in the "JOURNAL" for May 20, p. 1355.

Gas Heating-Burners.—Harris, J., and Vogel, L. H., of Cleveland, Ohio, U.S.A. No 13,208; June 10, 1902.

This invention relates particularly to burners for gas-stoves, with the object of forming a burner in which acetylene may be used for cooking or heating purposes. A further object is to provide means for preventing the overheating of the burner and the flashing-back of the flame; also to provide means for mixing air with the gas in the proper proportion to form perfect combustion.

The patentee points out that in the use of acetylene for cooking or heating purposes, it is important that the heat should be kept below 600° Fahr., because when this point is reached, molecular changes take place—producing benzine vapour, which requires several times the quantity of air for proper combustion that acetylene does. It is the aim of the present invention to accomplish this by locating the ignition-place as far as possible from the mixing-chamber, and by a new and improved burner to produce "perfect and safe" combustion of acetylene in a gas-stove.

APPLICATIONS FOR LETTERS PATENT.

20,212.—Holmes, E. D., "Method of treating coal gas to prevent loss of illuminants." A communication from O. N. Guldlin. Sept. 16.

20,215.—THWAITE, B. H., "Utilization of the volatile effluent gases from coke-ovens." Sept. 16.

20,242.—OFFENBERG, M., "Incandescent mantles." Sept. 16.

20,268.—CROWTHER, A., "Gas-irons." Sept. 17.

20,303.—LEWICKI, T., "Revivification of filtering materials." Sept. 17.

20,319.—LACROIX, E., "Gas-meters." Sept. 17.

20,343.—SLADING, J., "Gas-lighter." Sept. 18.

20,361.—RAINEY, F. E., "Cooling towers." Sept. 18.

20,368.—SMITH, W., "Rotary pump or meter." Sept. 18.

20,369.—STANDFAST, T. S., "Saturator for the manufacture of sulphate of ammonia." Sept. 18.

20,379.—PIKE, J P., "Gas-stoves." Sept. 18.

20,447.—BLAMIRES, H., and BOTTOMLEY, S., "Gas cooking-stoves." Sept. 19.

20,458.—TURNEY, E. T., "Photometers." Sept. 19.

20,554.—DUCELLIER, G., "Acetylene gas-generators," Sept. 20.

20,582.—CHUBB, H. R, "Generation of acetylene." Sept. 20.

Leeds Gas Coal Contracts.—The Leeds Corporation Gas Committee have now arranged for the whole of the coal which they will require for the year ending Sept. 30, 1903. The total contracts amount to 312,000 tons; and the prices show an average reduction of 1s. 6d. per ton on last year's rates—representing a sum of £23,400. In the year 1901-2, the Committee obtained an average reduction of 3s. 6d. per ton, so that current prices accord with those paid before the advance of 5s. per ton a couple of years ago.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by correspondents.*]

The Late Mr. Richmond—An American Tribute.

SIR,—I have been very much grieved to read of the death of Mr. Richmond, whose obituary appears in the last issue received here of the "JOURNAL." I would be very glad indeed to express similar sentiments to those headed "An Appreciation." I met Mr. Richmond twice in a social way during his visit to the States, and was exceedingly well pleased with him in every respect, and fully expected it was the beginning of a continuous friendship. Mr. Richmond impressed me more favourably than most anyone I have met in this country from the other side. His exceeding energy and genial disposition appealed peculiar to those who met him on his recent visit to this country. While nothing I could say would be of any effect, yet I felt like writing the above to someone, and knowing no other address have taken the liberty of expressing myself to you. Mr. Richmond's loss must be a peculiarly severe one to the gas fraternity in England, as it is a serious loss to the gas fraternity of the world.

New York, Sept. 19, 1902. GEO. G. RAMSDELL.

Illegal Use of Discs to Work Meters.

SIR,—In his first letter (in your issue of the 2nd inst.), Mr. Bush says: "With 130,000 slot meter consumers, perhaps our custom in such cases may be of interest to you and your readers. It has been quite a common occurrence to find foreign coins and metal tickets in the money-boxes of our meters; and on the attention of the consumer being drawn thereto, the requisite coinage has been forthcoming. In one particular district, where there is a very large and flourishing Co-Operative Society, I should not be exaggerating when I say that, in clearing the boxes, our collectors have found thousands of their metal tickets; but we have never considered these consumers were fraudulent, or intended to be." In his second letter (in your issue of the 16th inst., replying to mine in your issue of the 9th inst.) Mr. Bush says: "My object in writing on this subject was not to encourage the use of discs, but to prevent as far as possible legal or harsh measures being taken by gas companies except in extreme cases. Mr. Foulger in his letter omits all reference to this point. We shall continue to follow out the plan set out in my last letter."

Such a notification of past custom and declaration of future policy, if not actually encouraging the use of discs, appears to suggest that consumers can use them if so inclined.

Another object stated to be aimed at, is the prevention of legal proceedings against users of discs. I fear in this Mr. Bush is successful; as I fail to see how his Company could now come into Court against any offender after his published letters.

So far as harsh proceedings are concerned, I doubt if any gas company is so indifferent to its own interests as not to give every possible consideration to its customers, rather than meting out harsh treatment towards them.

At or about the end of tenancies, meters are frequently used by more persons than one. In such instances, it would be as difficult to trace the placer of a disc in a gas-meter as it would be in the case of a sweetmeat machine.

Obtaining either gas or chocolate out of a prepayment machine by means of a disc (unless inserted accidentally) appears to me a fraud, although the offender is willing to pay when found out. A person doing so is demanding value for something other than by means of a coin of the realm.

The Coinage Act, 1870 (33 Vict., cap. 10) enacts: "No piece of gold, silver, copper, or bronze, or of any metal or mixed metal of any value whatever shall be made or issued except by the Mint as a coin or token for money or as purporting that the holder thereof is entitled to demand any value denoted thereon."

Prepayment is the essence of the slot-meter scheme. Prepayment is the essence of the signed contracts. Prepayment alone justifies the extra cost of the meter attachment. Prepayment would alone enable a company to profitably carry out the obligations entered into.

If gas companies lightly disregard the importance of these points—by notifying a willingness, directly or indirectly, to accept substitutes for coins of the realm—a most serious blow would be struck at the whole prepayment scheme, which was conceived, and specifically worked out and adjusted, so as to make bad debts impossible.

Clapton Common, N.E., Sept. 25, 1902. G. F. L. FOULGER.

A New Condensing Stove.

SIR,—In your article on this (p. 738), you refer to the stove as having no sheet-iron condensing tubes to wear out, whereas in other stoves this material is employed. This is an error. We have never made a single condensing tube of any other material except brass or copper; and for many years we have used these tubes solid-drawn without a brazed joint, so as to ensure their permanence.

Also, with regard to the quantity of water condensed, 2 oz. of water condensed for every 5 cubic feet of gas burnt is by no means a large proportion; and, in any properly made condensing stove working below its maximum possible power, this quantity can easily be exceeded. It is purely a question of size and condensing surface, as compared with the quantity of gas consumed; and large stoves of low power, although the best, are so costly as to be practically unsaleable.

With regard to removing the products of combustion, this is easily done by connecting the outlet with a flue. But where a flue is available, many much cheaper and better forms of gas-fires and stoves can be used to better advantage. The only possible good point about a condensing stove is that it is the best form to use when a flue is not available. When it is, any condensing stove, whatever its form, is not worth a moment's consideration in comparison with an open gas-fire.

THOS. FLETCHER, F.C.S., Chairman,
FLETCHER, RUSSELL, AND CO., LIMITED.

Warrington, Sept. 24, 1902.

Incandescent Gas Lighting in the Colonies.

SIR,—Having read with close attention the "Communicated Article" (written by request) on "Incandescent Gas Lighting in Wellington, New Zealand," by Mr. R. G. Howell, the Secretary to the Wellington Gas Company, I venture to ask you to grant me a little space for the purpose of replying to that portion of Mr. Howell's remarks which more particularly concerns my Company and their policy in the Colonies.

Mr. Howell makes an indictment against this Company when he states that "the advancement of incandescent lighting in Wellington has been seriously handicapped, owing to the high prices charged by the Australasian Incandescent Gas-Light Company." Mr. Howell has told you that our "C" Welsbach mantle is now being sold at 8d., and the Sunlight white mantle at 6d., in the Colonies. I would ask you to consider for a moment whether these prices are reasonable or not, comparing them, as Mr. Howell desires, with those ruling at home. These retail prices of 8d. and 6d. respectively for the two kinds of mantles, are subject to a discount of 20 per cent., granted to the Wellington Gas Company as our agents for that city. They compare therefore, with 6d. and 4½d. ruling in this country, which are subject to about the same discount to gas companies.

When it is remembered that we have to face a duty of 25 per cent. on all our raw materials required by our Wellington factory for the purpose of producing mantles, as well as freight, which fluctuates between 40s. and 60s. per ton, added to which the enormously high wages imposed by the arbitrary and Socialistic legislation of the New Zealand Government, which must be taken into account, I think you will agree with me that the prices charged by my Company are not at all excessive.

It is quite impossible to compare fairly the prices ruling at home for Welsbach and Sunlight goods with our figures, since the quantities which the dense population of Great Britain permits the Welsbach Company to dispose of are gigantic as compared with those which the population of 4½ millions for the Commonwealth of Australia and the Colony of New Zealand permits us to sell each year; and this is an item which should not be overlooked on any account, as it is a well-known fact that a large output greatly reduces the cost of production, and in nothing is this maxim more true than in the manufacture of incandescent mantles. Nevertheless we have, by the introduction of the most up-to-date plant and automatic machinery, been enabled to produce an article at prices which, we believe, when submitted to careful and unbiassed reflection, will compare favourably with those ruling at home; and I do not think any trading company could afford to produce them cheaper at a profit, under Colonial conditions.

I have not touched upon the fact that our patents are valid, and that consequently we are in the position of monopolists, as this Company is trading rather on commercial lines than in the position of patentees, which I think, with the information before you, you will readily admit. I should only like to add that, if Mr. Howell wishes to compare our prices with those of infringers, I have nothing further to say, since I unhesitatingly assert that there is no mantle procurable, either in New Zealand or at home, which, with the exception of the English Welsbach, can compare, in lighting efficiency or durability, with those manufactured by my Company, as we have spared neither trouble nor expense in improving the quality of our productions.

The object of this letter has merely been a plea for an impartial and fair hearing, as it would appear to be impossible to satisfy the demands of some gas companies, even though they be acting as agents for the Company against whom they make charges in the Press.

Mr. Howell lays stress on the keenness of the competition between electricity and gas, which rages nowhere so fiercely as in New Zealand; but he omits to mention the fact that, had it not been for the timely appearance of the Welsbach mantle, gas as an illuminant, so far as New Zealand is concerned, would long ago have been annihilated.

In conclusion, I have only to say that, if the Wellington Gas Company are so anxious to fight the electric light, it would appear to me at least that the first and most important step would be to reduce the price of gas, which Mr. Howell admits to be 5s. 10d. per 1000 cubic feet; for surely this is a very much more important item in the struggle than the cost of an occasional mantle, about which so much fuss is made.

WELSBACH LIGHT COMPANY OF AUSTRALASIA, LTD.,
A. E. COHEN, Managing-Director.

2, *Bury Street*, E.C., *Sept.* 25, 1902.

LEGAL INTELLIGENCE.

THE INCANDESCENT TRUST, LIMITED.

In the High Court of Justice last Wednesday, before Mr. Justice Jelf (the Vacation Judge) a petition was presented by Mr. Winifred Mundler, for the compulsory winding up of the above Trust. It was stated by Mr. F. Mellor that petitioner had obtained judgment for £80, and, not getting payment, he on Sept. 14 presented a petition. No affidavits had been filed in opposition; but, on the previous day, a summons was taken out to set aside the judgment, which would come before the Master in the course of the day. Upon this, his Lordship said he would adjourn the petition until after the summons had been disposed of. Later in the day, it was stated that Master Chitty had made an order on the summons for the parties to attend to be cross-examined; and, under these circumstances, it was arranged that the petition should stand over for a week.

PREFERENTIAL RIGHTS TO A SUPPLY OF WATER.

In the "JOURNAL" for the 26th ult. (p. 548), reference was made to a judgment of the Supreme Court of Ohio in an action brought by certain riparian proprietors against the City of Canton, to restrain them from supplying water for manufacturing purposes when by so doing they interfered with their privileges. It may be remembered the Court decided in favour of the city; their reasons for so doing being set forth in the following judgment, the text of which appeared in the "Engineering Record."

The City of Canton is a municipal corporation, and is situated between the east and west forks of Nimishiller Creek—the forks meeting at or near the south line of the city, and thus forming the creek. The entire natural drainage of the city is towards and into these two forks of the creek, which is a natural watercourse. The city has established its system of water-works on the west branch of the creek, on a lot of land adjoining that branch; and it takes its water supply from the creek, and from certain wells near the same, and from Myers's Lake near by. The city uses so much of the water supply thus passing through its water-works as it needs for its use as a city, and supplies its inhabitants with water for domestic, commercial, and manufacturiug purposes, at a price fixed by the city, so as to produce an income about sufficient to pay the expenses of the water-works.

The defendants in error own a water-power grist-mill, located on the creek a short distance down stream, south of the city, and have used the water of the creek for many years—upwards of fifty—as power to run their mill, and until about the year 1887 there was sufficient water to supply both the city and the mill. But as the city grew, and extended its water-works, it used larger quantities of water, and thereby the supply to the mill became reduced to such an extent that in dry seasons of the year there was not sufficient water to run the mill all the time, and it became necessary to shut down at nights. Thereupon, in the year 1898, the defendants in error (the plaintiffs below) commenced an action in the Court of Common Pleas, seeking to recover damages from the city for thus using the water, and thereby diminishing the supply to the mill. The city claimed to be a riparian owner, and entitled to make such use of the water of the stream as it had made and that the plaintiffs below had no greater right to the use of the water to run their mill than the city and its inhabitants had to use the waters of the creek above the mill for domestic, commercial and manufacturing purposes.

Upon the trial of the case, these questions were put in issue by the pleadings and evidence. Thereupon the Court charged the Jury as follows:

> On the question of the right of the city to take this water for the purposes named, the city claims that substantially all the water diverted by it from the creek in question, and which was not returned to said creek, was used for the purpose of supplying the inhabitants of the city, and a small portion of territory adjoining thereto, with water for domestic, sanitary, agricultural, and manufacturing purposes; that the stream does pass now, and for many years has passed, in and through the corporate limits of the city; that it owns the premises upon which its pumping-station is situated, and has lines of pipe proceeding from the creek and pumping-station, and passing through the city, to supply the persons, and that it is, in a sense, a riparian owner located on the stream, and it claims that the inhabitants of the city so supplied by it have the rights of riparian owners in the stream—that is to say, the right to use same for domestic, agricultural, sanitary, and manufacturing purposes. I am requested by the defendants' Counsel to say to you, as matter of law, that if these facts are true, and if the water so drawn from the stream, and not returned to it so as to be effective for the plaintiffs' water power, was substantially all consumed by the citizens of the city and the territory adjoining thereto for the purposes and uses aforesaid, and if their uses were reasonable in manner and extent, then the city would not be liable to the plaintiffs, although such use might so diminish the volume of the stream that at certain times of the year it would cause a substantial diminution of the plaintiffs' water power. I say I am asked by defendant's Counsel to so instruct you; but I cannot so instruct you, as a matter of law. On the contrary, I say to you, as a matter of law, that the undiminished flow of a natural private stream, such as the one in question is conceded to be, is the right of every riparian owner, yet this right is limited to this extent—that each riparian owner may, without subjecting himself to liability to another lower riparian owner, use from the stream whatever is needed for his own domestic purposes and the watering of stock. The defendant—the city—cannot be considered a riparian owner, within the scope of this exception.

The city saved exception to this part of the charge, and to the charge as a whole. A verdict was returned in favour of the plaintiffs below—motion for new trial being overruled—judgment entered on the verdict against the city, and a bill of exception allowed, signed and made part of the record. The Circuit Court affirmed the judgment, and thereupon the city filed its petition in error here, seeking to reverse the judgments below.

As this is an action against the city for damages, no question as to eminent domain, or appropriation of private property for public uses, is involved in the issue; the controlling issue being as to whether the city, as a municipal corporation, is a riparian proprietor having the right to use the waters of the creek for its own purposes, and to supply them to its inhabitants for the ordinary purposes of life, and as to whether the right to use water from a stream by one riparian proprietor for manufacturing purposes, such as running a grist-mill, is inferior or equal to the right to use the water from the same stream by an upper proprietor for domestic purposes.

It is urged by Counsel for defendant in error that a Municipality situated on a natural watercourse is not, in its corporate capacity, a riparian proprietor, and that only those inhabitants whose lots or lands border on the stream are such proprietors; and some cases are cited which seem to take this view of the law. Other cases are decided upon the theory that such Municipality is itself, in its corporate capacity, a riparian proprietor, and entitled as such to riparian rights in the stream upon which it is situated. In this State, the question remains undecided by this Court, and therefore is an open one, and we are at liberty to follow such rule of decision as is supported by sound reason and the weight of authority.

It was held by this Court, in *City of Mansfield v. Balliett*, that a city situate on a stream is liable, in its corporate capacity, to a lower proprietor for polluting the water of the stream by running the sewage of the city and its inhabitants into the stream. This case holds the city, in its corporate capacity and as an upper proprietor, liable to a lower proprietor for polluting the water of the stream; and if the city is liable not only for its own acts, but also for the acts of its inhabitants, in flowing sewage into the stream, it must be upon the principle that, as an upper riparian proprietor, it has violated its duty toward a lower riparian proprietor on the same stream, and that therefore the city, in its corporate capacity, is a riparian proprietor on the stream, and must bear the burdens of such position. While the inhabitants own their lots individually, the city owns the streets, the fire department, and all other public property and public works; and, in its corporate capacity, it provides for the convenience and welfare of its inhabitants as to streets, fire protection, lighting, and supplying water. In such and other like matters the city overshadows the individuals, and stands, in its corporate capacity, as a single proprietor extending throughout its entire limits, and entitled, as such, to all the rights, and subject to all the liabilities, of a riparian proprietor on the stream upon which it is situated. Sound reason, the weight of authority, and the present advanced state of municipal government, rights, and liabilities, require that a municipality should be held and regarded, in its entirety, as an individual entity, having, in its corporate capacity, the rights, and subject to the liabilities, of a riparian proprietor; and we so hold in this case.

The bringing of the action against the city for damages is of itself an implied admission that the city, in its corporate capacity, is an upper proprietor, liable for the wrongful diversion or use of the water of the stream upon which it is situated. Being charged with the liability of such upper proprietor, as conceded by bringing the action, and as was rightly held in the City of Mansfield case, it must also be accorded the rights and benefits of such proprietor. As such proprietor, the city uses the water of the stream, through its water-works, in extinguishing fires, sprinkling streets, and other public purposes, and supplies water to its inhabitants for domestic use and manufacturing purposes. Being an upper riparian proprietor, it follows, as a matter of law, that it has the right to use out of the stream all the water it needs for its own purposes, returning to the stream all that is not consumed in such use; not, however, transporting the water or diverting it. The right of an upper proprietor to use the water of a stream for manufacturing purposes is at least equal to that of a lower proprietor on the same stream to use it for a like purpose; and so long as the upper proprietor uses the water reasonably, and returns back into the stream all the water not consumed in the use, the legal rights of the lower proprietor are not invaded. There being no right of property in the water of a natural flowing stream (the only right being to the use of the water as it flows by the lands adjoining the stream), it follows that, as the water comes first to the upper proprietor, he may use it reasonably for power purposes, returning to the stream all that is not consumed in the use, and that the right of the lower proprietor attaches only to the use of the water that comes to his premises after passing, and so serving the purposes of, the upper proprietor.

As the right of the city to supply water to manufactories within its bounds for power purposes is only equal to the right of a lower proprietor to use water for the same purpose, the question arises in this case as to the rights of the parties to use the water of the stream for such purposes. The question is a difficult one, both in theory and application, as the different sizes of streams and different circumstances have caused Courts to make different holdings, but the combined result of the cases seems to be this: Where there is not sufficient water in a stream to supply fully the needs of all the proprietors upon it for power purposes, no one has the right to use all the water, and thereby deprive those below him from the use of any; nor can those below rightly insist that those above shall use no water for power, and thereby save it all for those below. Each should use the water reasonably, and so as to do as little injury to the others as circumstances will permit. As a loss must fall upon one or the other of such proprietors, neither should be compelled to bear the whole loss; but the water should be so divided and used that each one may bear his reasonable proportion of the loss. In case of difference between upper and lower proprietors, the question should be left to the sound judgment of a jury, under proper instructions, to say whether the party complained against has used for power purposes, under all the circumstances, more than his just proportion of the water of the stream. This being so, the City of Canton, in supplying water to its inhabitants for power purposes, had the right to use the water of the stream to a reasonable extent only, and so as to do as little injury as might be, under all the circumstances, to the lower proprietor; each party bearing an equitable share of the loss caused by the shortage of water. Dry seasons are not caused by either party, but are the acts of God; and each party must bear the losses resulting to him therefrom.

From the earliest dawn of history to the present time, the primary use of water has been for domestic purposes, and its secondary use for the purposes of power. People on the upper stream have the right to quench their thirst, and the thirst of their flocks and herds, even though by so doing the wheels of every mill on the lower stream should stand still. And the same right in the use of water as to quenching thirst extends to all uses for domestic purposes; and the right of a lower proprietor to the use of the waters of a stream for power purposes is subject to the superior right of all upper proprietors for domestic purposes, and must yield thereto. All water powers on a stream are established subject to the superior right of all upper proprietors to use water out of the stream for domestic purposes, and if the upper proprietors have grown so large or become so numerous as to consume most or all of the water, the lower proprietors have no cause of complaint, because it is only what they should have reasonably expected in the growth and development of the country, and subject to which contingency they established their water powers.

In addition to taking water from the stream for its own use, and supplying the same to its inhabitants for domestic and manufacturing purposes, the amended petition avers that the city supplied water to its inhabitants for commercial purposes. If this means only that the city

received pay for the water so supplied, and thereby made the water an article of commerce, the averment is of no force. The city having the right to supply water to its inhabitants for domestic and manufacturing purposes, it can make no difference in that right that the supply is for pay rather than for nothing. The injury, if any, to the lower proprietor, arises from the taking of the water, and not from the pay received therefor.

It is also averred in the amended petition that the city supplies water to people outside the city for domestic, commercial, and manufacturing purposes. If such supply to outsiders, or to be transported away from the city for commercial purposes, is sufficient in quantity to materially injure the defendants in error, taking into consideration the size of the stream and the water supply, the city is to that extent exceeding its right as a riparian proprietor. The general rule has been well stated as follows: "The principle established by a long line of decisions is that the upper riparian owner has the right to the use of the stream on his land for any legal purpose, provided he returns it to its channel uncorrupted, and without any essential diminution; that in all such cases the size and capacity of the stream are to be considered, and that any interruption of, or interference with, the rights of the lower riparian owner is an injury for which an action will lie, unless too trifling for the law to notice." The obligation to return the water to the stream without "any essential diminution" means that the water not consumed in the use or "legal purpose" must be returned to the stream, or an opportunity given for it to flow back into the stream by the ordinary channels. It cannot be lawfully diverted or transported, so as to prevent it from flowing back into the stream.

The city having no right to materially diminish the flow of the water in the stream to the injury of defendants in error by supplying water to outsiders, or for commercial purposes to be transported to other parts, or to supply to its inhabitants for power purposes an unreasonable quantity, as above pointed out, it follows that if the city has materially diminished the flow of the water in the stream by so supplying water to outsiders or for transportation, or unreasonably for purposes of power, it is liable to respond in damages to the party injured thereby; but for the water consumed by the city for its own purposes, or so supplied to its inhabitants for domestic use, even though it received pay therefor, it is not liable. The water taken by the city from the stream for its own use, and so supplied to its inhabitants, is taken by virtue of its rights as a riparian proprietor, and not by virtue of the right of eminent domain, and therefore no compensation need be made therefor.

The general rule, that a lower proprietor is entitled to the natural flow of a stream undiminished in quantity, subject to the lawful use of the water by upper proprietors, has been referred to with approval by this Court in several cases. In the City of Mansfield case, there was no question involved as to the volume or quantity of water; the only question being as to the liability of the city for polluting the waters of the stream, and the right of the lower proprietor to recover damages for such pollution. The case of *The Iron Company v. Tucker* was also brought by a lower proprietor against an upper one for damages for polluting the waters of a stream. The question as to the pollution of the waters of a stream in this State seems to be fairly well settled by these two Ohio cases; but they do not determine the relative rights of upper and lower riparian proprietors as to the use of the waters of a stream, as was so strongly urged by Counsel for defendants in error.

The Court of Common Pleas erred in its charge to the Jury as to the city being an upper riparian proprietor, and as to its right to use water out of the stream for its own purposes, and as to its right to supply water from the stream to its inhabitants for domestic and manufacturing purposes. The real and only question upon which a liability could be founded—viz., whether the flow of the water in the stream was materially diminished, to the injury of the lower proprietors, by the supplying of water by the city to people outside of its limits, or to be transported away from the city for commercial purposes, or by an unreasonable supply of water for power purposes—seems to have been overlooked, and no charge requested or given on that subject. The Circuit Court erred in affirming the judgment of the Common Pleas. Both judgments will be reversed, and the cause be remanded for further proceedings.

A Bogus Gas-Meter Inspector.

At Walsall, last Friday, a man named Sydney Barrett was charged with committing thefts at various houses at which he called under the pretence that he was authorized to examine the gas-meters and fittings. After looking at the meter, the prisoner would express a wish to see how the burners were acting. He would then get the person in charge of the premises to remain in the room watching the lights, while he ostensibly returned to the meter, but in reality hastily decamped with any portable property upon which he could lay his hands. The Magistrates committed him to prison for six months with hard labour.

A Gas-Meter Inspector for Coventry.—The Coventry City Council last Tuesday agreed to the appointment of an Inspector of Gas-Meters for the city, though at the previous meeting a recommendation to this effect was defeated. It was explained that the office would be combined with the duties of an existing official—the Inspector of Weights and Measures. There was the usual protest from Councillor Halliwell, a representative of the Ratepayers' Association, who contended that if the time of the Inspector of Weights and Measures was not now fully taken up, it ought to be. A question was raised as to whether it was correct that a firm of meter manufacturers were coming to Coventry. Councillor Rotherham, the Chairman of the Gas Committee, replied in the affirmative, stating that the firm was actually in Coventry already. In answer to Councillor Halliwell, he jocularly observed that the duties of the marking of these meters might not quite kill the official who undertook them. The recommendation, which came from the Market Hall Committee, was carried.

MISCELLANEOUS NEWS.

UNACCOUNTED-FOR GAS AT DUKINFIELD.

A Comprehensive Report by Mr. Harrison Veevers.

"It is not surprising that the great increase in the amount of leakage during the past few years [at Dukinfield], culminating in an excessive rise in the quarter ended June 30 last to 22·47 per cent., as against 18·18 per cent. for the corresponding quarter of last year, should excite alarm, and a strong desire to have a thorough investigation of the causes and of the remedies to be applied." These are the opening words of a report on the subject that Mr. Harrison Veevers, the Engineer of the Dukinfield Corporation Gas-Works, volunteered to submit to his Committee at their last monthly meeting, and which he has already prepared. After the quoted introductory statement, what follows will be read with interest. Mr. Veevers says:

In this report I use the word "leakage," for the sake of brevity, rather than the clumsy but correct expression, "unaccounted-for gas." It means the difference between the quantity of gas registered by the station meter at the gas-works and by the consumers' meters and by the meters at the works, offices, &c., and any gas the quantity of which is estimated for, as in the case of the consumption by street-lamps. I have prepared two tables and two diagrams of leakage—one set yearly, since 1877, when the works were acquired by the Local Authorities of Dukinfield, Denton, and Haughton; and the other set giving the quarterly percentages of loss for and since 1889—the first year they were systematically reported to you. The diagrams, founded on the figures, indicate more graphically the variations of leakage than do the accompanying tables.

The question of leakage is naturally of great importance in the economic administration of a gas undertaking. The loss of even 5 per cent. in any business would be considered serious; but when the amount reaches 33 per cent., or even more, as in some gas departments, the matter becomes one that demands inquiry.

A number of reasons may be assigned for leakage. Among them are the following: (1) Loss of gas from main-pipes; (2) loss of gas from service-pipes; (3) loss during the laying of mains and services; (4) loss caused by filling new mains; (5) loss from the supply of public lamps; (6) loss owing to the difference of temperature of the gas when registered by the station meter and by the consumers' meters; (7) loss due to the conversion, in the mains, of gas into liquids and solids; (8) loss due to alterations in the date of reading the indices quarterly and yearly; and (9) loss through omission to take the difference of stocks in the gasholders. It may be as well to discuss these items separately.

Regarding Nos. 1, 2, 3, and 4, there can be no question that the bulk of leakage is due to defects in pipes, whether cast iron, wrought iron, or lead; and this is more particularly evident in a district like Dukinfield, partly undermined by colliery operations and disturbed by sewer work. The parts from which the coal has been taken subside in most cases bodily, while the parts unaffected remain rigid—the result being the fracture of mains and buildings near the neutral line. An item of unaccounted-for gas, not exactly leakage, is that, in laying new mains, no allowance is made for the quantity of gas required to fill the pipe and of gas which escapes when the connections are made. In the case of the new 10-inch main pipe recently laid in Dewsnap Lane, I estimate there was a loss of 12,000 cubic feet of gas; the main itself requiring 8700 cubic feet to fill, and the balance of loss being due to making connections.

But the most important waste occurs in the service-pipes, particularly where connected with the main, and in the corrosion of the wrought-iron service-pipes between the mains and the meters. Pipes have been taken up with as great an area of holes as of metal. To check this element of waste, in 1884 I introduced the use of lead pipe for services, and prohibited the use of wrought iron under ground. The effect of this change was not at once evident; but subsequently, commencing in 1886, the leakage gradually diminished from 20·8 to 7·68 per cent. in 1897. As will be seen from diagram No. 1, the leakage has gradually increased, until, in the year ending last March, it indicated 16·05 per cent. This increase is no doubt due to the sewer operations from Stalybridge boundary along Park Road and Wharf Street and through Plantation Farm, and, latterly, to the extraction of coal in shallow workings under Plantation Farm. Special attention has been paid to these sources of leakage; men having been detailed to make systematic examinations for the discovery of escapes on the line of the sewer-pipe. A number of serious escapes have been found to be due to the leaving in the ground of disused wrought-iron service-pipes, which have corroded in time. Such pipes, when not further required, should be disjointed at the main and the hole plugged up. Two great escapes were recently discovered between the Great Central Railway and the works of Messrs. Roberts Bros., away from ordinary access. I am having this main-pipe—the first one laid by the late Gas Company—thoroughly examined over its whole length.

As to No. 5, the loss from the supply of gas to public lamps may not be exactly leakage; but it may influence the percentage by insufficien estimation of the amount the lamps consume, or from burning a longer time than is allowed for, or from defects in burners, which may allow a larger consumption than is calculated, or from excessive size of the flash-light of incandescent burners, or from the lamps being lighted on extraordinary occasions, and not reported. From careful calculations, I consider the consumption by street-lamps, with allowances for pilot-lights as arranged by the Borough Surveyor and myself, to be correct. I observe, however, in the account of the consumption from March 31 to the end of the lighting season on May 15 this year, there was an error. Only 49 lamps were allowed as incandescents, whereas there were 117—making an error of 17,500 cubic feet as unaccounted-for. There should be, on the part of the Gas Committee, a proper super-

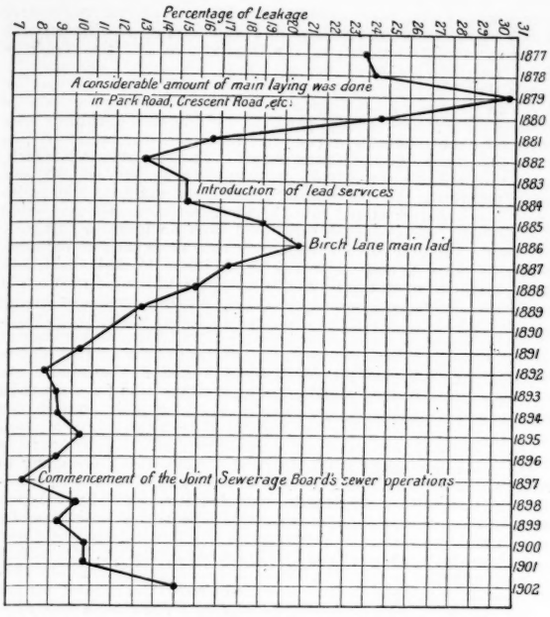
Percentage of Leakage
A considerable amount of main laying was done in Park Road, Crescent Road, etc.
Introduction of lead services
Birch Lane main laid
Commencement of the Joint Sewerage Board's sewer operations

DIAGRAM I.—*Showing the Percentage of Leakage Yearly since* 1877.

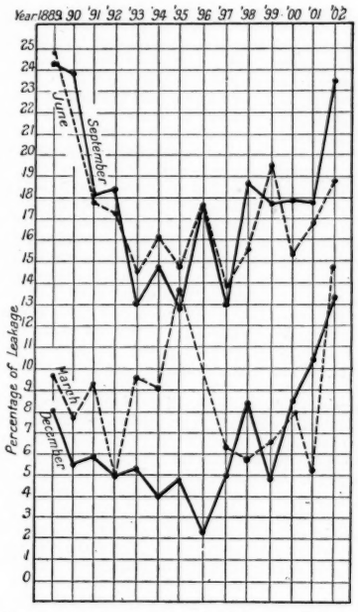

DIAGRAM II.—*Showing the Percentage of Leakage from* 1889 *to* 1902 *for each Quarter—i.e., March, June, September, and December.*

vision of the hours of lighting and of extinguishing, and a proper check on the size of the flames by some one deputed to perform this duty.

The question of temperature and conversion of gas, in items Nos. 6 and 7, need not be discussed, as they have never been taken into consideration. It may be stated that, when tested, there was not much difference in the temperature of the gas at the station meter and at the consumers' meters. The registration of the station meter and of some consumers' meters which were tested *in situ* was found accurate in water-line and registration. No allowance has ever been made for temperature; so that this would not affect the recent increase in the leakage. The question of attention to consumers' meters is one of vital importance. I knew of a case where a gas company was saddled with 37½ per cent. of loss, which is now reduced to 7 per cent., chiefly through proper attention to this matter. I am pleased to report that the meter inspectors give attention to this important point.

Under No. 8, there will not be any error in amount; but there may be displacement of gas registered from one quarter to another. The registrations of consumptions are taken at the end of each quarter; and as the work cannot be done on one day, the indices are read on the corresponding day every quarter, before or after the end of the quarter. If the registration in the case of a large consumption be taken a few days before or after the usual time, the total for the quarter will be affected; and therefore a greater or a smaller leakage will be the result. This will not apply in Dukinfield, as care is taken to have all indices read on the day corresponding to that on which they were taken in the previous year.

With reference to No. 9, the omission to take account of the quantity of gas stored in the gasholders at the end of the June quarter made a difference in the amount of leakage of 80,000 cubic feet. The calculations have been made on the gas made, and registered by the station-meter. The quantity of leakage in the June quarter (1902) was 3,307,300 cubic feet; but from this report it will be seen that from this the following deductions should be made: For stock not taken into account, 80,000 cubic feet; for error in lamp account, 17,500 cubic feet; for Dewsnap Lane main, 12,000 cubic feet; total, 109,500 cubic feet. This will lower the percentage of 22·47 by about 1 per cent. I have tested the two gasholders, any loss from which would be included in leakage, and have found them perfectly gas-tight.

There can be no question that, when all the old wrought-iron services have been removed or changed for lead ones, when the colliery seams which, through entire stoppage, have ceased from troubling the surface, and, last and most important, when the gas-mains between the gas-works and Ashton Street have been removed, a more satisfactory leakage will be the result.

TABLE I.—*Giving the Percentage of Leakage from the Transfer of the Works to the Townships of Dukinfield, Denton, and Haughton, in* 1877 *to* 1902.

Year ending.	Percentage of Leakage.	Remarks.
June 30. 1877	24·00	
1878	24·50	A considerable amount of main laying was done in Park Road, Crescent Road, &c.
1879	30·85	
1880	24·75	
1881	16·85	
1882	13·12	
1883	15·66	
1884	15·50	Introduction of lead services.
Mar. 25. 1885	19·00	
1886	20·80	
1887	17·25	
1888	15·83	
1889	13 33	
1890	11·06	
1891	10·46	
1892	8·70	
1893	9·26	
1894	9·33	
1895	10·62	
Mar. 31. 1896	9·26	
1897	7·68	Commencement of the Joint Sewerage Board's sewer operations.
1898	10·13	
1899	9·51	
1900	10·78	
1901	10·85	
1902	16·05	

TABLE II.—*Giving the Percentage of Leakage from* 1889 *to* 1902 *for each Quarter—i.e., June, September, December, and March.*

Year	June Quarter.	Sept. Quarter.	Dec. Quarter.	March Quarter.	Year ending Mar.
1889	24·92	24·44	8·27	9·69	13·33
1890	21 31	23·99	5·65	7·42	11·06
1891	17 85	18·01	5·82	9·31	10·46
1892	17·60	18·44	4·98	4·48	8·70
1893	14·41	12·97	5·15	9·67	9·25
1894	16·38	14·82	4·16	9·42	9·33
1895	14·65	12·60	4·68	13·94	10·62
1896	17·50	17 32	2·24	9·84	9 26
1897	13 84	12 97	4·88	6·05	7·68
1898	15·45	18·53	8·66	5·81	10·13
1899	19·61	17·63	4·88	6 49	9·51
1900	15·37	17 75	8·66	8·02	10·78
1901	16·66	17·68	10·17	5·30	10·85
1902	18·88	23·60	13·13	14·41	16·05

TABLE III.—*Giving the Make, Sale, and Leakage of Gas Quarterly, in Thousands of Cubic Feet, for the Years ending March,* 1889, 1891, 1896, *and* 1902.

Quarter.	Make.	Sale.	Leakage.	Per Cent.
June, 1888	8,131	6,104	2,027	24·92
Sept. ,,	7,596	5,739	1,856	24·44
Dec. ,,	20,570	18,868	1,702	8·27
March, 1889	20,485	18,498	1,986	9·69
Year	56,782	49,210	7,571	13·33
Average	. . .	. . .	1,893	
June, 1890	8,935	7,339	1,595	17·85
Sept. ,,	8,554	7,013	1,541	18·01
Dec. ,,	22,466	21,158	1,307	5·82
March, 1891	22,690	20,576	2,113	9·31
Year	62,645	56,087	6,557	10·46
Average	. . .	. . .	1,639	
June, 1895	9,392	7,748	1,643	17·50
Sept. ,,	9,312	7,698	1,613	17·32
Dec. ,,	23,788	23,253	535	2·24
March, 1896	24,732	22,297	2,434	9·84
Year	67,224	60,997	6,227	9·26
Average	. . .	. . .	1,557	
June, 1901	13,496	10,947	2,548	18·88
Sept. ,,	15,571	11,895	3,675	13·60
Dec. ,,	35,339	30,697	4,641	13·13
March, 1902	32,415	27,742	4,672	14·41
Year	96,821	81,283	15,537	16·05
Average	. . .	. . .	3,859	

NOTE.—Any differences between the totals and the additions are due to the use of hundreds of cubic feet in the original tables.

BRITISH GASLIGHT COMPANY, LIMITED.

The Half-Yearly Ordinary General Meeting of this Company was held last Wednesday, at the London Offices, No. 11, George Yard, Lombard Sireet, E.C.—Mr. J. HORSLEY PALMER in the chair.

The SECRETARY (Mr. H. B. Chamberlain) read the notice convening the meeting, and also the following report of the Directors on the half-year's working :—

The available profit is £25,047, after deducting the following sums, and adding £2953 from the Hull reserve fund, £288 from the Potteries reserve fund, and £956 from the Trowbridge reserve fund; the parliamentary interest at those stations not having been realized by these respective amounts. The deductions (omitting shillings and pence) are as follows: Income-tax, £1363; Hull debenture interest, £986; Norwich debenture interest, £892; Potteries debenture interest, £376; Trowbridge debenture interest, £164; interest on debenture stock, £1127—total, £4910.

HULL.—The gas-rental at this station shows an increase of £1465, as compared with that of the corresponding period of 1901, the price of gas having been the same at each period—viz., 2s. per 1000 cubic feet. Coke shows a decrease of £1205; tar and tar distilling, a decrease of £573; and ammoniacal liquor and sulphate, an increase of £952. Coal has cost 15s. 3d. per ton, as against 16s. 7d. per ton. Coke realized 13s. 4d. per ton, as against 13s. 8d. per ton. The gas sent out was 526,225,000 cubic feet, against 521,979,812 cubic feet—an increase of 4,245,188 cubic feet, or equal to 0·81 per cent. Of this quantity, 49,412,000 cubic feet was supplied in bulk to the Corporation for the supply of the Old Town. The profit realized is £2953 less than the parliamentary interest. This sum has been taken from the reserve fund; leaving a balance of £18,661.

NORWICH.—The gas-rental at this station shows a decrease of £65, as compared with that of the corresponding period of 1901; the price of gas having been reduced from 3s. 6d. to 3s. 3d. per 1000 cubic feet from the 1st of April, 1902. Coke shows a decrease of £373; and tar and ammoniacal liquor an increase of £762. Coal has cost 17s. 11d. per ton, as against 22s. 4d. per ton. Coke has realized 9s. 7d. per chaldron, as against 12s. per chaldron. The gas sent out was 198,264,000 cubic feet, as against 191,480,000 cubic feet—an increase of 6,784,000 cubic feet, or equal to 3·54 per cent. The profit realized is £2416 less than the parliamentary interest.

POTTERIES.—The gas-rental at this station shows an increase of £253, as compared with that of the corresponding half of 1901; the price of gas having been the same—viz., 2s. 8d. per 1000 cubic feet. Coke shows a decrease of £2572; and tar, ammoniacal liquor, and sulphate a decrease of £413, Coal has cost 13s. 4d., against 15s. 11d. per ton. Coke has realized 6s. 9d., against 12s. 1d. per ton. The gas sent out was 183,704,000 cubic feet. against 184,577,000 cubic feet—a decrease of 873,000 cubic feet, or equal to 0·47 per cent. The profit realized is £288 less than the parliamentary interest. This sum has been taken from the reserve fund; leaving a balance of £18,482.

TROWBRIDGE.—The gas-rental shows a decrease of £72 over the corresponding period of 1901; the price of gas having been reduced from 3s. 6d. to 3s. 4d. per 1000 cubic feet from the 1st of January, 1902, the discounts remaining the same. Residual products show a falling off of £259. Coal has cost 16s. 11d., against 19s. 4d. per ton. Coke has realized 10s. 7d., against 15s. 2d. per ton. The gas sent out was 28,793,500 cubic feet, as against 28,130,800 cubic feet—an increase of 662,700 cubic feet, or equal to 2·35 per cent. The profit realized is £956 less than the parliamentary interest. This sum has been taken from the reserve fund; leaving a balance of £680.

HOLYWELL.—The gas-rental at this station shows a slight increase. Residual products have realized nearly the same amount; and the profit is £344.

The available profit added to the previous balance of profit and loss amounts to £56,628. From this sum the Directors recommend a dividend at the rate of 10 per cent. per annum, clear of income-tax. This will amount to £23,000, and leave a balance of £33,628.

The Directors who go out of office are Mr. J. Horsley Palmer and Mr. Frederick Wilkin. The Auditors are Mr. Edward Yardley and Mr. E. Knowles Corrie; and they respectively offer themselves for re-election.

The CHAIRMAN, moving the adoption of the report and accounts, said he should have very little to say on this occasion, because the half year had been one of the quietest ever known in the history of the Company, both as to working and important events. First with regard to Hull, it would be within the recollection of the shareholders who were present at the last half-yearly meeting, that he informed them the Directors were buying the gas-works in the Cottingham district. This transaction had been satisfactorily concluded at a price which, as he said on the last occasion, the Board believed would pay the Company; and the works had been handed over. They were not supplying gas from the works now, but the requirements of the district were being met from the Hull works. In regard to Hull, the general business of the city had been very slack; and he knew of no manufacture that felt the pulse of trade better than that of a gas company. Immediately trade was at all bad, the increase that was looked for in gas fell off; and the consequence was that at Hull they had not had the considerable increase which had taken place during the last ten years. This, however, was nothing to be alarmed at. The business had not suffered from the electric light particularly—it was merely through stagnation in trade, which they hoped in course of time would change for the better; and of this there was no doubt. But whatever increase had taken place at Hull had been in what they called their own district; and such falling off as there had been was in the interior district for which the Company supplied the Corporation with gas in bulk. That was in what he might call the concentrated portion of Hull, where all the trade and business of the place was carried on; and it was there they had felt the decrease. However, as to the Hull accounts, they appeared in a much more satisfactory light than the last two or three half years. As he said on previous occasions, they did not raise the price of gas unduly at Hull. On the contrary, having a large reserve fund in connection with the station, the Directors decided that the wisest and best policy to pursue was not to tax the consumers because coal was very dear; and they therefore took from the reserve fund a considerable portion to meet the deficiency. There was still a deficiency in the accounts of something like £2900, compared with about £9000 when coal was very dear. This pointed to an equilibrium being gradually arrived at; and he had no doubt that, at the end of the coming half year, they would again be in possession of their full profit without drawing on the reserve fund. At a former meeting, he said that this would be the case; and he was glad his prophecy was in a fair way of fulfilment. It would also be remembered that they had to raise fresh capital for Hull; and, in accordance with the wishes of the Corporation, the Directors invited the people of Hull to subscribe for the issue of the 3½ per cent. debentures, in the hope that there would be a liberal response. This was not the case. The people of Hull apparently expected a higher rate of interest on their money than 3½ per cent. But as the debentures were not taken up, the Directors had to offer them at 4 per cent.; and, at this rate of interest, they had been placed. Turning next to Norwich, he said the business there had certainly met with very considerable success; and it was the one station where there had been a large increase. The Manager stated that the increase was continuing—that during the past three months there had been an increase of nearly 10 per cent.; and that this was still going on. With such an increase, it naturally came to pass that they would have to make additions to their plant, and more or less reconstruct part of the old portions of their works. To carry this into effect, the Directors were now having plans prepared to make what he might term a model works at Norwich. Next year it would be seven years since they last applied to Parliament for more capital, and the Directors foresaw that in the coming session they would have to go to Parliament again to raise further funds. As this might seem to some of the shareholders rather soon for them to be going to Parliament again, perhaps he should explain that in the old days, they were not in the habit of including in the capital allowed by Parliament what they used as working capital. But in 1901 the City of Norwich brought a Chancery suit against the Company to determine the question; and it was decided by the Court that, whatever working capital was employed at Norwich (it amounted to between £20,000 and £25,000), should be included in the capital authorized by the Acts; and therefore, the shareholders would see, there was a sum of £20,000 to £25,000 less to spend on plant at this station. Thus they would be compelled to go to Parliament for fresh capital. At the Potteries, the new gasholder (which was not in use at the time of the last meeting) had now been brought into service. They were also completing a railway siding on to the new land, which was in close proximity to the railway; and, in the course of time, they would have to erect a retort-house on the new site. This had been necessitated owing to the workings of the Coal and Iron Company underneath the Company's old works, which had caused very serious sinkings, and rendered some of the buildings dangerous. But the business at the Potteries (as anybody who was connected with that part of the country knew) had been in a bad state indeed, and trade had been very depressed. Notwithstanding, the Company had kept their position there; and the poorer class of people were now using a great deal more gas than formerly. At Trowbridge (one of the stations at which they had introduced fresh plant), everything was going on exceedingly well. There was a scare of electric lighting there; but owing to the introduction of incandescent gas lighting on a very good scale for public lighting, they had not heard anything more of the electric light—in fact, the incandescent gas-light was giving the greatest satisfaction to the public and to the Municipality. In his concluding remarks, the Chairman mentioned that the Company's lease of the London offices had been renewed for 21 years. They had occupied these offices since 1824; and although they would now have to pay an increased rent, the Board thought it best not to move from the old place where they had done so well.

Mr. FREDERICK WILKIN seconded the motion, which was carried unanimously.

The CHAIRMAN moved the declaration of a dividend of £1 per share, clear of income-tax, for the half year. He said he was glad to be able to say that the Directors did not intend to deduct the income-tax, as he hinted at the last meeting would perhaps have to be done. The accounts showed they were able to pay the dividend, *plus* income-tax.

Mr. R. S. GARDINER seconded the motion, which was unanimously carried.

On the proposition of Colonel WILKINSON, seconded by General CORRIE, Mr. J. Horsley Palmer was re-elected to his seat at the Board; and Mr. Frederick Wilkin was likewise returned, on the motion of Mr. CORBET WOODALL, seconded by Mr. GARDINER.

The Auditors (Mr. Edward Yardley and Mr. E. K. Corrie) having been re-appointed,

Mr. GRAHAM WILKIN proposed, and Mr. HARRIS seconded, a vote of thanks to the Chairman and Directors.

This was cordially agreed to; and a similar compliment having been passed to the Secretary, Managers, and their respective staffs, the proceedings terminated.

ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY.

Half-Yearly Report and Accounts.

The report which will be presented at the half-yearly meeting of this Company to-day states that the result of the working for the six months ending June 30 shows the gross receipts to have amounted to £149,119, and the expenditure, including £6247 interest paid upon debenture loan, &c., to £113,027, leaving a net profit of £36,092. To this sum has to be added £5146 carried forward from previous accounts, making a total of £41,238. Out of this, the Directors recommend the payment of the usual dividends of 10½ and 7½ per cent. per annum on the respective shares. The reduction of 3d. per 1000 cubic feet in the price of gas, which took effect from December last, amounted to over £7000 for the half year. The market for residuals has had a downward tendency as compared with the corresponding period of the previous year; the reduction in receipts under this head amounting to over £6000. During the six months, there has been an increase of 16,767,000 cubic feet in the sales of gas. From the accounts accompanying the report, it appears that the revenue from the sale of gas in the six months, including meter-rents, was £127,799; the amount received for residual products being £20,944. Adding to this rents and transfer fees, brings the total receipts up to £149,119. On the expendi-

ture side of the revenue account, manufacture of gas cost £76,041, of which £57,478 was for coal, cannel, and oil; distribution cost £15,292; and management, £5002. Sundry other items make the total expenditure £106,780, leaving a balance of £42,339 to be carried to profit and loss account. Adding to this the £5146 brought forward from the previous accounts, and deducting £6247 for interest on loan capital and commission, leaves the sum of £41,238 available for division. The quantity of gas produced from the 43,749 tons of coal, 1472 tons of cannel, and 1,146,629 gallons of oil used was 746,752,000 cubic feet, of which 654,216,000 feet were sold and 670,504,000 feet accounted for. The estimated quantities of residuals produced in the half year were: Coke, 56,232 chaldrons; breeze, 6901 chaldrons; tar, 574,480 gallons; and ammoniacal liquor, 821,099 gallons.

COMMERCIAL GAS COMPANY.

The Half-Yearly Report and Accounts.

The following is the report of the Directors of this Company for the half year to June 30, which, with the accounts for the same period, will be presented at the meeting of the proprietors on Thursday.

The Directors submit the accounts for the half year ended the 30th of June, 1902. The revenue account shows a net profit for the half year of £57,133 18s. 4d., which, added to the balance of £248 19s. brought forward from last year, produces a net revenue balance of £57,382 17s. 4d. Deducting therefrom £6515 18s. 4d. for interest, there remains standing to the credit of the net revenue account a balance of £50,866 19s. available for dividend. The Directors recommend the payment of dividends thereout at the rates of 12½ per cent. per annum upon the old stock of the Company, and of 9½ per cent. per annum upon the new stock, both less income-tax. The balance of the net revenue will be carried forward to the next half year. The Company's Bill in Parliament ("The Commercial Gas Act, 1902") has received the Royal Assent. In accordance with the provisions of the Act, the standard 10 per cent. old stock, the standard 7 per cent. new stock, and the 4½ per cent. debenture stock will be converted into 4 per cent. stock, 3½ per cent. stock, and 3 per cent. debenture stock respectively, in the following proportions, excluding fractions of £5 of stock: £250 4 per cent. stock for every £100 10 per cent. stock; £200 3½ per cent. stock for every £100 7 per cent. stock; £150 3 per cent. debenture stock for every £100 4½ per cent. debenture stock. The conversion will come into operation on the 1st of January next. Notice will subsequently be sent to the proprietors when the new stock certificates are ready to be exchanged for those now existing.

The accounts accompanying the report consist of the usual statements. They show that stock to the amount of £801,875 has been raised out of the total of £830,000 authorized; and that £271,875 has been borrowed out of £300,000 sanctioned. The receipts on capital account amount, with premiums, to £1,127,753; and the expenditure to £1,129,783; making the amount spent in excess of receipts £2029. In the six months covered by the accounts, £2665 was spent on account of a new steamship; £1116 on mains, services, &c.; £383 on meters; £1748 on stoves; and £3713 on prepayment meters and fittings (less £2623 written off for depreciation)—making together a total of £9626. The reserve fund amounted on June 30 to £23,773; and the insurance fund to £28,652. The balance-sheet shows that the value of stores at the close of the half year was as follows: Coals, oils, &c., £30,364; coke and breeze, £1757; tar, ammoniacal liquor, sulphate of ammonia, &c., £6390; and sundries, £19,170—making a total of £57,682. At the corresponding period of 1901 the figures were: Coals, oil, &c., £33,894; coke and breeze, £2369; tar, liquor, and sulphate, £4320; and sundries, £18,355—making a total of £58,938. The revenue and net revenue accounts are given below.

Revenue Account.

Expenditure.

Manufacture of gas—			
Coals and oil, including dues, carriage, unloading, and trimming	£92,453 2 11		
Salaries of Engineer and officers at works	2,511 10 0		
Wages (carbonizing)	19,061 11 7		
Purification—including £4024 18s. 2d. for labour	7,638 13 5		
Repair and maintenance of works and plant, materials, and labour, less £221 18s 7d. received for old materials	20,197 15 2		
		£141,862 13 1	
Profit sharing		3,211 14 2	
Distribution of gas—			
Salaries and wages of officers and rental clerks	£2,258 14 3		
Repair, maintenance, and renewal of mains and services, material, and labour	2,953 4 6		
Repair and renewal of meters	2,046 11 2		
" " " " stoves	2,382 4 9		
" " " " automatic meters and fittings	2,623 15 9		
Incandescent mantle maintenance, &c.	478 1 5		
		12,742 11 10	
Public lamps—lighting and repairing		2,731 3 3	
Rent, rates, and taxes		8,950 8 7	
Management—			
Directors' allowance	£1,250 0 0		
Company's auditors	75 0 0		
Salaries of secretary, accountant, and clerks	1,336 10 9		
Collectors' salaries and commission	1,630 7 7		
Automatic meter collection	550 14 1		
Stationery and printing	810 5 8		
General charges	742 1 8		
		£6,394 19 9	
Bad debts		732 14 6	
Discounts and allowances		3,335 1 2	
Law and parliamentary charges		772 15 4	
Superannuations and allowances		213 0 2	
Official officers		103 10 5	
Total expenditure		£181,050 12 3	
Balance carried to net revenue account		57,133 18 4	
		£238,184 10 7	

Receipts.

Sale of gas—		
Common gas per meter at 2s. 8d. and 2s. 6d. per 1000 feet	£173,625 9 5	
Public lighting and under contracts, common gas	8,663 11 9	
		£182,297 1 2
Rental—		
Meter	£2,725 18 10	
Stove	2,590 11 9	
Automatic meter and fittings	3,904 6 1	
Incandescent mantle maintenance	220 10 5	
		9,441 7 1
Residual products—		
Coke, less £4365 18s. 1d. for labour	£25,889 0 0	
Breeze, less £626 1s. 3d. for labour	725 10 4	
Tar	9,597 1 10	
Ammoniacal liquor and sulphate of ammonia	10,057 12 8	
		46,269 4 10
Miscellaneous receipts—		
Rent receivable	£158 5 0	
Transfer fees	25 12 6	
		183 17 6
Total receipts		£238,184 10 7

Net Revenue Account.

Balance on Dec 31, 1901	£44,583 6 6
Less amount of dividend paid for half year ended Dec. 31, 1901	44,334 7 6
	248 19 0
Balance from revenue account	57,133 18 4
	£57,382 17 4
Interest on debenture stock	£6,117 3 9
Interest balance	398 14 7
Balance available for dividend, carried to balance-sheet	50,866 19 0
	£57,382 17 4

The following are the statements relating to the manufacturing operations of the Company in the half year:—

Statement of Coals.

Description.	In Store Dec. 31, 1901.	Received During Half Year.	Carbonized During Half Year.	Used and Sold During Half Year.	In Store June 30, 1902.
	Tons.	Tons.	Tons.	Tons.	Tons.
Common	33,306	106,159½	104,411½	531	34,523
Cannel	3,230½	..	589½	..	2,641
Total	36,536½	106,159½	105,001	531	37,164
Oil—gallons	288,689	1,093,263	1,165,439	..	216,513

Statement of Residual Products.

Description.	In Store Dec. 31, 1901.	Made During Half Year.	Used During Half Year.	Sold During Half Year.	In Store June 30, 1902.
Coke—tons	3,129	63,952	15,636½	49,136½	2,308
Breeze—tons	1,500	10,777	..	10,796	1,481
Tar—gallons	696,825	1,330,450	..	1,473,331	553,944
Ammoniacal liquor—butts	8,108	34,344	39,777	..	2,675
Sulphate of ammonia—tons	116	1,075	..	1,031	160

Statement of Gas Made, Sold, &c.

Quantity Made (meter register and estimated).	Quantity Sold.		Total Quantity Accounted for.	Number of Public Lights.
	Public Lights and under Contracts (estimated).	Private Lights, per Meter.		
Thousands.	Thousands.	Thousands.	Thousands.	
1,486,505	53,954	1,311,676	1,388,608	4,850

ORIENTAL GAS COMPANY, LIMITED.

An Extraordinary General Meeting of this Company was held at the London Offices, Finsbury House, Blomfield Street, E.C., last Wednesday—Mr. R. Hesketh Jones in the chair—for the purpose of passing a resolution—"That the 30,000 shares of £5 each, the 30,000 shares of £4 10s. each, and the 15,000 shares of £1 each, respectively, in the capital of the Company, and all which shares have been issued and fully paid up, be converted into stock."

The Secretary (Mr. H. J. Luff) having read the notice convening the meeting,

The Chairman, in moving the adoption of the resolution, said that when they met last November he ventured to predict that they would very shortly complete the conversion of their shares into stock; but it did not do for a layman to speak about legal proceedings, or to give any opinion as to when they might terminate. The delay in their case, however, had arisen from the following causes. First, it must be remembered that their works were 6000 miles away in Calcutta. It was necessary to advertise there as well as in England; and, by order of the Court, Feb. 1 last was fixed for the list of creditors to be sent in. They arranged in Calcutta that the whole of their liabilities up to that date should be extinguished; and this was done, with the exception of the deposits they had in hand from the gas consumers and on account of the contracts for tar. These remained as liabilities, and had to be declared to the Court as such. Then in May they had to

advertise again, both in England and in Calcutta, that all claims should be finally sent in by July 18. They were so sent in, and cleared off, with the exception of a liability which was unearthed in connection with the London office. The Company had taken a lease of the office for a certain number of years; and the Court said this was a liability which they ought to declare. He mentioned this to show the extreme care exercised by the Court in protecting creditors. This, of course, meant further delay; but the matter came on for final hearing on Aug. 8, and a week later they obtained the Order of the Court. This enabled them, a month after the latter date, to remove from the title of the Company the words "and reduced," which they had been obliged to add while carrying the scheme through; so that they were now restored to their original name. The Order of the Court had to be registered; and this was effected on Aug. 28. From that date, the capital was reduced to the amount already paid up, and no further liability rested on the shares. The day fixed for this meeting was the earliest possible time for passing the resolution for the conversion of the capital. He explained this in order to show that, though he was rash enough to promise that the matter should be completed early in the year, everything had been done to get it finished as soon as they could. It was the intention of the Directors to convert the shares into stock in sums of £5 and multiples thereof; as this would greatly facilitate the payment of the dividends.

Mr. ROBERT MILLER seconded the motion, and it was carried unanimously.

The CHAIRMAN, in reply to a vote of thanks, said that at the forthcoming annual meeting he expected to have something which would be of interest to tell them. The Company would now be in a much healthier condition than hitherto, under new Articles of Association, and with the anomaly of having partly-paid shares done away with.

SHREWSBURY GAS COMPANY.

The Annual Meeting of this Company was held last Wednesday, under the presidency of the Chairman, Mr. J. SPENCER PHILLIPS.

The report which was presented stated that the profit on the year's working amounted to £5562, out of which an interim dividend of 2½ per cent. had been paid in March last; and it was recommended that the authorized dividend of 5 per cent. for the year be declared. After providing for this, and for interest on mortgages, there would be a balance of £691 to carry forward. The reserve fund amounted to £8210, and was fully invested in Consols. There had been an increase of 7½ million cubic feet in the consumption of gas during the year (equivalent to 4·96 per cent.), notwithstanding the mild winter. The unaccounted-for gas had further decreased to 6·38 per cent. A moderate abatement in the price of coals having been obtained in the contracts for the current year, the Directors had made a further reduction of 2d. per 1000 cubic feet in the price of gas, as from June 30. As an opportunity occurred of purchasing some freehold property adjacent to the Company's works, the Directors considered it prudent to avail themselves of it. The continual progress of the business rendered it necessary that greater productive capacity should be at once provided; and the Directors were, therefore, causing plans to be prepared for erecting additional works, of the most modern type, upon the land already provided. During the year 349 cooking and heating stoves and 346 slot meters were fixed; and the demand in both departments showed no sign of abatement.

The CHAIRMAN, in moving the adoption of the report and accounts, said it was an especial pleasure on this occasion to meet the shareholders; for, without indulging in any exaggerated statement, he thought the present report was the most favourable one they had ever had during the 82 years of the Company's existence. The amount which they had spent on capital account in the last twelve months was £4011; and more than half of this was required for slot meter installations and stoves for hire. They also spent £1319 in the purchase of some land contiguous to the works, which they thought desirable to acquire. During the year they carbonized 16,411 tons of coal, which was an increase of 859 tons over the preceding year, or equivalent to 5·32 per cent. The increase in the gas made amounted to no less than 7,083,000 cubic feet, which was equal to 4·29 per cent. But though they made this much more gas, they had sold even more—viz., 7,463,000 cubic feet, which was approximately 5 per cent. The reason for this was that the unaccounted-for gas had been reduced from 7·5 to 6·38 per cent.; and they hoped to lower it still further. They were still suffering from the effects of the disturbance of their mains caused by the sewerage operations. There was one feature he thought they would regard with every satisfaction, and this was the steady, continued, and he might say remarkable, progress of the undertaking. In 1863, which was the earliest time of which they had any reliable data, the make of gas amounted to 34 million cubic feet. In 1872, nine years later, it had increased to 65 million feet, in 1882 to 100 million feet, in 1892 to 137 million feet, and in 1902 to 172 million feet. These were very striking figures—showing that the increase during the past twenty years had been no less than 72 per cent. They were not a decaying or a dying industry. With regard to revenue, the receipts amounted to £32,429, which was a decrease of £1998 compared with the previous year. The reason for this was that they reduced the price of gas by 4d. per 1000 cubic feet. Also owing to the decrease in value of residuals, they had received £659 less under that head. He was pleased to say, however, that the saving on the expenditure side amounted to still more—viz., £2093. This was effected under three heads. They saved £1396 on coal, although they carbonized 859 tons more. Then they saved £1033 on the repairs and maintenance of the works and plant—not by neglecting to keep everything belonging to their undertaking up to the highest possible state of efficiency, but simply by the fact that they were reaping the benefits of the money spent in past years, and in consequence fewer renewals were necessary. They also saved £493 under

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 873.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
590,000	10	Apl. 11	10½	Alliance & Dublin 10 p.c.	19½–20½	+1	5 2 5
100,000	10	,,	7½	Do. 7 p.c.	13–14	..	5 7 2
300,000	100	July 1	5	Australian 5 p.c. Deb. .	100–102	..	4 18 0
200,000	5	May 14	6½	Bombay, Ltd. . . .	6–6½	..	5 0 0
40,000	5	,,	6½	Do. New, £4 paid	4½–4¾	..	5 9 5
380,000	Stk.	Aug. 14	12	Brentford Consolidated	249–254	..	4 14 6
270,000	,,	,,	9	Do. New . . .	184–189	..	4 15 3
50,000	,,	,,	5	Do. 5 p.c. Pref. .	125–130	..	3 16 11
206,250	,,	June 17	4	Do. 4 p.c. Deb. .	111–114	..	3 10 2
220,000	Stk.	Sept. 11	10⅔	Brighton & Hove Orig.	207–212	..	5 1 5
246,320	,,	,,	7⅔	Do. A. Ord. Stk. .	152–157	..	4 18 9
460,000	20	Sept. 26	10	British.	39–40*	..	5 0 0
50,000	10	Aug. 14	12	Bromley, Ord. 10 p.c. .	22–24	..	5 0 0
82,850	10	,,	9	Do. 7 p.c. . . .	18–20	..	4 10 0
500,000	10	May 14	7	Buenos Ayres (New) Ltd.	10–11	..	6 7 3
250,000	Stk.	June 24	4	Do. 4 p.c. Deb.	93–95	−1	4 4 3
150,000	20	July 11	8½	Cagliari, Ltd. . . .	21–23	..	7 3 6
100,000	10	Sept. 26	10	Cape Town & Dis., Ltd.	14½–15½*	..	6 9 0
50,000	50	May 2	6	Do. 6 p.c. 1st Mort.	54–56	..	5 7 2
550,000	Stk.	Apl. 11	12½†	Commercial Old Stock	267–272	..	4 11 11
251,875	,,	,,	5½†	Do. New do. .	205–210	..	4 10 6
271,875	,,	June 12	4½	Do. 4½ p.c. Deb.	130–134	..	3 7 2
800,000	Stk.	May 28	9	Continental Union, Ltd.	138–143	..	6 5 10
200,000	,,	,,	7	Do. 7 p.c. Pref.	147–152	..	4 12 1
575,000	Stk.	Aug. 28	5⅓	Crystal Palace Ord. 5 p.c.	118–123	..	4 6 8
60,000	,,	,,	5	Do. 5 p.c. Pref. .	120–125	..	4 0 0
106,158	,,	July 11	5	Do. 5 p.c. Deb. Stk.	139–142	..	3 10 5
486,090	10	July 30	10½	European, Ltd. . . .	18–19	..	5 10 6
354,060	10	,,	10½	Do. £7 10s. paid	13–14	−½	5 12 6
15,243,200	Stk.	Aug. 14	4	Gas-light and Coke { 4 p.c. Ord. . .	87–89	−1	4 9 11
2,600,000	,,	,,	3½	{ 3½ p.c. max. .	88–90	..	3 17 9
3,799,735	,,	,,	4	{ 4 p.c. Con. Pref.	108–110	−1	3 12 9
4,193,975	,,	June 12	3	{ 3 p.c. Con. Deb.	92–94	..	3 3 10
70,000	10	Nov. 13	8	Hongkong & China, Ltd.	14–15	..	5 6 8
3,800,000	Stk.	May 14	10	Imperial Continental .	205–207	..	4 16 7
473,600	Stk.	Aug. 14	3½	Do. 3½ p.c. Deb. Red.	98–100	..	3 10 0
561,000	Stk.	Aug. 28	10	Liverpool United A	225–229	..	4 7 4
718,100	,,	,,	7	Do. do. B .	165–167	..	4 3 10
306,083	,,	June 24	4	Do. do. Deb. Stk.	116–118	..	3 7 10
75,000	5	June 12	5	Malta & Medn., Ltd. .	4¼–4⅜	..	5 5 3
560,000	100	Apl. 1	5	Met. of { 5 p.c. Deb.	106–110	..	4 10 11
250,000	100	,,	4½	Melbourne { 4½ p.c. Deb.	103–105	..	4 5 9
541,920	20	June 12	5½	Monte Video, Ltd. . .	9–10	..	7 0 0
1,515,892	Stk.	Aug. 8	4½	Newc'tle & G'tesh'd Con.	103–104	..	4 6 7
346,855	Stk.	July 4	3½	Do. 3½ p.c. Deb.	99–100	..	3 10 0
303,000	Stk.	—	8	Oriental, Ltd. . . .	—	..	—
60,000	5	Sept. 26	7	Ottoman, Ltd. . . .	6–6½*	..	5 7 8
					* Ex div.		

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
851,070	10	Apl. 25	7	River Plate Ord. . .	10–10½	..	6 13 4
300,000	Stk.	June 24	4	Do. 4 p.c. Deb..	93–96	..	4 3 4
250,000	10	Sept. 26	8	San Paulo, Ltd.. . .	11⅛–12½*	..	6 8 0
135,000	Stk.	Sept. 11	10	Sheffield A	236–239	..	4 4 0
209,984	,,	,,	10	Do. B	235–237	..	4 4 5
523,498	,,	,,	10	Do. C	235–237	..	4 4 5
6,000,000	Stk.	Aug. 14	5⅓	South Met., 4 p.c. Ord.	120–123	−1	4 6 8
1,700,000	,,	July 11	3	Do. 3 p.c. Deb. . .	91–93	−1	3 4 6
380,940	Stk.	May 14	5	Southampton Ord. . .	102–106	..	4 11 4
87 950	,,	July 11	4	Do. 4 p.c. Deb.	102–105	..	3 16 2
120,000	Stk.	Aug. 28	6	Tottenham and Edmonton { A. 5 p.c. B. 3½ p.c.	118–123 / 93–98	..	4 17 7 / 4 11 10
300,520	,,	,,	4½				
182,380	10	Jan. 16	5	Tuscan, Ltd.. . . .	7–8	..	6 5 0
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	95–98	..	5 2 0
230,000	5	Aug. 14	5½	West Ham, 10 p.c. . .	10–11	..	4 6 4
172,000	10	,,	6½	Do. 7 p.c. . .	13½–14½	..	4 9 8
				WATER COMPANIES.			
780,599	Stk.	June 24	11⅓	Chelsea, Ord. . .	300–310	..	3 14 2
150,000	,,	,,	5½	Do. 5 p.c. Pref. .	152–157	..	3 3 8
160,000	,,	,,	4½	Do. 4½ p.c. Pref. '75	140–143	..	3 2 11
175,785	,,	Sept. 26	4½	Do. 4½ p.c. Deb. .	137–142*	−¾	3 3 5
1,720,560	Stk.	Mar. 26	8	East London, Ord.. .	218–223	+3	3 11 9
654,740	,,	June 12	4½	Do. 4½ p.c. Deb. .	142–147	..	3 1 3
1,282,943	,,	,,	3	Do. 3 p.c. Deb. .	97–99	..	3 0 7
700,000	50		8	Grand { 10 p.c. max..	110–115	..	3 9 7
310,000	Stk.	Sept. 26	4	Junction { 4 p.c. Deb..	125–130*	+1	3 1 7
708,000	Stk.	Aug. 14	14	Kent	285–295	..	4 14 11
160,000	,,	,,	7	Do. New, 7 p.c. max..	195–205	..	3 8 4
1,043,800	100	June 24	11	Lambeth, 10 p.c. max..	290–300	..	3 13 4
406,200	100	,,	8½	Do. 7½ p.c. max..	210–220	..	3 17 3
350,000	Stk.	Sept. 26	4	Do. 4 p.c. Deb..	125–130*	+2	3 1 7
500,000	100	Aug. 14	12,8/10	New River, New Shares	390–400	..	3 4 0
1,000,000	Stk.	July 30	4	Do. 4 p.c. Deb..	125–130	..	3 1 7
902,300	Stk.	June 12	7	South-wark and Vauxhall { Ord. . . . 7½ p.c. max. 5 p.c. Pref. .	195–200 / 180–185 / 152–157	..	3 10 0 / 3 15 8 / 3 3 8
126,500	100	,,	7				
489,200	Stk.	,,	5				
1,019,585	,,	Apl. 11	4	Do. 4 p.c. A Deb.	125–130	..	3 1 7
1,155,066	Stk.	June 12	10	West Middlesex. . .	275–285	..	3 10 2
200,000	,,	,,	4½	Do. 4½ p.c. Deb. .	139–144	..	3 2 6
200,000	,,	Sept. 11	3	Do. 3 p.c. Deb. .	95–97	..	3 1 10
					* Ex div.		

† Next dividend will be at this rate.

the head of repairing, refixing, and renewing meters. They had completed the work of general inspection and testing of the meters which had been going on for two years; and all the old and defective meters had now been replaced. Therefore it was not necessary to spend so much in this direction. There had been an increase under two items of expenditure. The first was that of wages. There were three reasons for this—the increased make of gas, a concession they had made to their stokers by giving them an eight-hour instead of a twelve-hour shift, and certain repairs which had been charged under the head of wages instead of under another head, as previously. There was also an increase of rates and taxes, which was a matter absolutely beyond their own control. They had to pay heavier income-tax; and their rates under local taxation had increased as well. The question of local taxation, he thought, was one of the most serious problems of the present day. The tendency not only in Shrewsbury—and perhaps less in Shrewsbury than in other places—was a steady increase in this direction. Everything which tended to increase the rates of Shrewsbury must militate against the growth and prosperity of the town; and they as traders felt it in a double sense. They not only had to pay heavier rates, but it prevented people coming and settling there who would probably spend a large amount of money in the town. Turning to the general balance-sheet, they would see they had in hand on capital account £372. Last year they had overdrawn a sum of £3229. They had also reduced their overdraft at the bank; and at the present time they owed the bank nothing. The number of stoves on hire had largely increased during the past year—there being 1338; and the slot meters in use numbered no less than 2028. Since January the Company had undertaken at a very small cost, both the cleaning and renovating of incandescent mantles; and this had proved a very good thing, and was much appreciated by their customers. He thought he might say that there was no light at the present time in existence comparable to incandescent gas-light, taking economy and efficiency into consideration. Including the cost of what was paid by the consumer for the repair and renewal of mantles, it panned out to less than one-sixth the cost of the electric light. Possibly some might say the Company looked at the matter through their own spectacles; but what were the real facts of the case? At Liverpool, the second city in England, the electric light was in the hands of the Corporation; the gas supply being the property of a private Company. Lately, however, the Corporation had put in their streets no less than 20,000 incandescent gas-lights, so convinced were they of the economy and efficiency of the light. In Bradford, another large town, where both the electric light and gas were in the hands of the Corporation, they were doing the same; and so they were in Manchester. He had referred to the remarkable strides made in the sale of gas, and the increase in the demand for it; and he might fairly say now that they had almost, if not quite, reached the limit of their possibility of supply. If they had a very severe winter, it would tax the energy of their able Manager (Mr. William Belton) and his staff to the utmost to produce a sufficient quantity of gas; and therefore they had had plans prepared and were inviting tenders for the erection of new works on the land they acquired in 1878. They proposed to make a 50 per cent. addition to their plant; and though he did not say they would have work for the whole immediately, he was convinced that it was much more economical to make one addition of 50 per cent. than two additions of 25 per cent.

The report was adopted, and the dividend (as recommended by the Directors) was declared.

TORQUAY GAS COMPANY.

The Company and Municipal Trading.

In his statement to the shareholders of the Torquay Gas Company, at the half-yearly meeting on Thursday last, the Chairman (Mr. W. H. Kitson) said that the estimate of the expenditure for the half year was £12,634, and of the receipts £16,064; while the surplus after payment of the dividend would be £33. This was a more satisfactory position than last year, when they anticipated a deficit of £800. During the last six months there had been an increase in the consumption of 1,162,000 cubic feet; but the revenue was less by £334, owing to a reduction in the price of gas. The action brought against the Company with regard to ancient lights had been settled by a compromise not disadvantageous to the Company; but the sum of £500 appeared in this half-year's statement on account of the costs of the litigation. The Company had also been put to expense in preparing to oppose a Company who gave notice of their intention to promote electric tramways, but afterwards abandoned the application. He thought it very unfair that they should have to incur unnecessary expense in such a matter, and have no remedy against the Company. The Corporation were considering the question of tramways; and it was said that they would be forced to proceed with the matter lest some speculative company should come in. It was a matter of great concern to the Gas Company. Electric trams were likely to have a serious effect on the gas-mains, besides which, if tramways were introduced and did not pay, the Company, as large ratepayers, would have to contribute heavily towards the loss. Mr. J. Young pointed out that the charge for the electric arc lighting imposed an unfair burden on the ratepayers to bolster up the undertaking. The charge of the Torquay Town Council for these lamps was £22 per annum; while at Newton Abbot an Electric Light Company had agreed to provide better lamps for £16 a year. He did not think they should have to pay a fancy price to make the Corporation's pet scheme look successful, especially when the Gas Company could light the streets as well as they were lit at present for half the cost. The report was adopted; and the maximum statutory dividends were declared.

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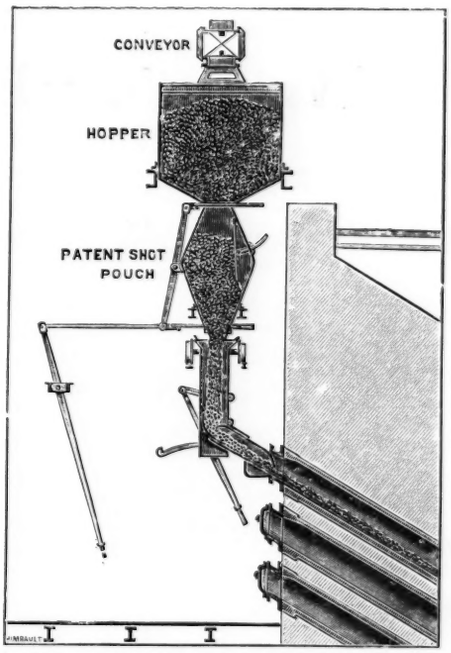

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NEW CONVEYOR CO., LTD., SMETHWICK.

SOUTH AUSTRALIAN GAS COMPANY.

The Annual Meeting of this Company was held in Adelaide on the 27th ult., under the presidency of the CHAIRMAN (Mr. J. Acraman).

The report stated that, owing the great advance in the cost of coal, the expenditure was considerably more than in the previous year. There was, however, an increase in the quantity of gas sold, which enabled the Board to declare the usual dividends. The contract with the Adelaide Corporation for street lighting had been renewed for five years, at a slightly reduced price; and agreements were entered into with the Corporations of Port Adelaide, Unley, and St. Peters for lighting street-lamps in these municipalities for seven years. The Directors have now arranged to supply gas cooking-stoves on the time-payment system, as well as at present on hire agreements. Customers who now have stoves on may, if they choose, come under the new agreement. Following the example of leading gas companies in England and elsewhere, the Board have decided that the Company shall undertake the installation of Welsbach burners and the periodical inspection and cleaning of burners and chimneys and renewals of mantles, &c. The revenue for the year ending June 30 amounted to £92,950, and the expenditure to £62,485; leaving a profit of £30,465.

The CHAIRMAN, in moving the adoption of the report, said the receipts had been larger than in the previous year; but the profits had not been so great, owing to the increased price of coal. The consumption of gas and residuals had grown. They had established a fidelity and guarantee fund of their own; the company in which their officers were guaranteed being in liquidation. They had put down £500 as a fund, to which would be added annually the premium which had been paid in former years. Bad debts were considerably under ½ per cent. on the receipts. The presence of the electric light in Adelaide had not affected them materially; while at the Port it had practically not affected them at all. In the other States, the instalment of the electric light had not been satisfactory. At Rockhampton, the loss was so severe that the company running it could not pay a dividend; while a Hobart gas company, who also conducted electric lighting works, managed to squeeze a dividend out of the gas profits. The Melbourne Corporation had placed £8000 to debit on account of the electric light. In England, the corporations had been playing ducks and drakes with the rates, and Parliament had to intervene. They ordered the Councils of Bermondsey and Woolwich to charge sufficient for the electric light to cover the cost and protect the ratepayers. In many places in Europe, the electric light was being superseded by Welsbach burners. A South Australian now in England had written out stating that in the Paris streets they had 64,000 Welsbach burners; the increase in the past year having been over 1000. All the London bridges were more effectively lighted with gas than with electricity; and the Melbourne Harbour Trust had had the electric lights on the wharfs replaced by Welsbach burners.

The motion was carried.

HALIFAX GAS-WORKS INVESTIGATIONS.

The "Halifax Courier" writes: "The Halifax Gas Committee are reported to be annoyed because we have been the means of giving the ratepayers abstracts of two important reports relating to their own property [see p. 829]. We fail to understand the reason for their annoyance, or why the ratepayers should be kept in ignorance of transactions which affect them. When a concern in one year makes a profit of £4227, and in the next incurs a loss of £13,197, the ratepayers may be excused for being inquisitive about the details of the business generally. But if blame there be for the extensions in hand, it does not attach so much to the present Committee as to Committees in the past with whom the extensions originated. The Committees have been composed of estimable gentlemen of good business ability; but until the present year we believe there has not been one of them with technical and practical knowledge of gas-works engineering. There have been coal merchants whose services, no doubt, have been useful in that department. But it is one of the weaknesses in corporation trading concerns that a man is supposed to be qualified for the work though brought up in an entirely different business. When the extension of the works was projected, the Manager very wisely suggested that an eminent Engineer should be consulted on the plans he had prepared; but a course so obviously advisable, where a large expenditure of money was contemplated, was not taken. The Manager naturally concludes that previous work he had done for them had inspired their confidence; and he is now so sure of the wisdom of the extensions that he suggests that his share of the work should be judged by an expert, by whose award he is prepared to stand."

A special meeting of the Gas Committee was held last Tuesday for the purpose of considering the report of the Sub-Committee appointed to inquire into the extensions and expenditure incurred at the gas-works during the last two or three years and the reply of the Manager to the statements contained in the report. The meeting was strictly private, not even an official of the Corporation being allowed to be present. After what is said to have been a very lively meeting, lasting over three-hours-and-a-half, the Committee dispersed. Inquiries by a pressman as to what had been done elicited the statement that the Committee had done nothing which they could communicate.

Mr. R. Morley has given notice of the following motion for to-morrow's meeting of the Council: "That the Mayor be respectfully requested to call a special Council meeting as early as possible in October to receive and discuss the report from the Gas-Works Inquiry Committee on gas-works extensions, appointed March 5, 1902." It is presumed, that by the "Gas-Works Inquiry Committee," Mr. Morley refers to the Sub-Committee appointed by the Gas Committee. There is nothing on the minutes of the Gas Committee to be presented for confirmation at Wednesday's meeting to show that the Sub-Committee's report has yet been adopted by them.

Wright's "Eureka" Gas-Fires.

The "E.R."

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The Gas-Fire here illustrated, unlike ordinary Gas-Fires, sets into any Coal Grate, without fitting, when front bars are removed, and is specially designed to meet the requirements of the coming season.

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To fit in Opening	*12 in.*	*14 in.*	*16 in.*	*18 in.*
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GAS PROFITS AT BIRMINGHAM.

The Proposed General Powers Bill.

Birmingham is at the present time in a great state of excitement over the General Powers Bill which is being promoted by the City Council—more especially that part of it which relates to the tramways. Meetings are being held at which speeches are made both for and against the measure; and all the trading departments of the Corporation seem to be dragged into the discussion. At a gathering of working men last Thursday, Mr. Stevens, in the course of a strong speech in favour of the Bill, remarked that an attack had been made on the Gas Committee; and as he was a member of that body, he was very jealous of the undertaking. The Property Owners' Association said that the Gas Committee were only making a paltry £12,000 per annum; but he quoted figures to show that, though the charges for gas had been reduced from 3s. 6d. per 1000 cubic feet in 1875 to 2s. 9d. less 5 per cent. for prompt payment, in 1902, and as low as 2s. 3d. to large consumers, the income had increased from £314,144 in 1876 to £686,820 in 1902. The cost of management had also been reduced from 1d. per 1000 cubic feet in 1875 to less than ½d. in 1902, which represented a saving of £10,000 per annum. The gross profit of the undertaking in 1876 was £123,283, and in 1902 £144,481. But if the price had been maintained at 3s. 6d. per 1000 cubic feet, the gross profit last year would have amounted to at least £350,000; so that by the reduction in the price a saving had been secured to the gas consumers of over £200,000 per annum. If the gas undertaking had belonged to a company, the profits would have gone into the pockets of a comparatively few shareholders; but the profit last year was applied in the payment of annuities and interest, an appropriation to the sinking fund for the reduction of the debt of £29,319, the payment of £30,557 to the relief of the rates, and a direct payment in aid of rates from interest on the reserve fund of £4000; and owing to a reduced charge for gas supplied to public lamps, there was a further saving to the ratepayers in the city of £11,272, in respect to the lighting of the courts £3013, and in aid of public lighting outside the city £4410. Thus the profits for the year consisted of £82,571, or an amount in favour of the city, after all interest had been paid, of very nearly 3¾ per cent. on the debt of the Gas Department of slightly over £2,250,000. During the 27 years the Corporation had had possession of the gas undertaking, the gross profit had amounted to £3,577,324, of which £709,562 had been applied to a reduction of the rates, £37,072 in the erection of the gas offices and Art Gallery, £100,000 in the creation of a reserve fund, and £642,768 in the formation of a sinking fund to reduce the debt on the department—or a total of £1,489,402. In addition, the price of gas had been reduced by at least 9d. per 1000 cubic feet, the wages of the men had been increased, their hours reduced, a week's holiday with pay given them every year, and they had a pension when they could no longer work.

NEW ENGLAND GAS AND COKE COMPANY.

Sale of the Property Ordered.

Last April, it was announced that the undertaking of the New England Gas and Coke Company had been placed in the hands of a Receiver, in consequence of the inability of the Company to fulfil their obligations (see "JOURNAL," Vol. LXXIX., p. 1117). We now learn that on the 8th inst., Judge Colt, of the United States Circuit Court at Boston, entered a decree ordering the sale of the property. The report says that no bid under $10,000,000 shall be accepted; the first payment to be $100,000. The suit arose out of a default in the payment of interest on the bonds of the Company aggregating $16,862,000. Mr. R. M. Burnett, the Receiver, is the Special Master who will conduct the sale. Under the decree, the transferees of the contract between the Dominion Coal Company and the New England Gas and Coke Company become bound by the acceptance of the transfer and conveyance to resume and perform all the covenants and agreements on the part of the New England Gas and Coke Company contained in that contract. The funds arising from the sale are to be applied first to the payment of the expenses of the sale and the cost of the Court proceedings. It is provided that the Court shall reserve the question whether the Receiver's certificates shall be given priority over the rights of bondholders. The residue shall be applied to the payment of the principal and interest of the bonds. If the amount realized by the sale is insufficient to pay the par value principal of the bonds, the money is to be applied *pro ratâ* for the payment of the same. If the sum is more than sufficient, then the proceeds shall be applied towards the payment of the principal of the bonds and then for the *pro ratâ* payment of interest thereon as represented by the outstanding coupons maturing June 1 last. Any surplus is to be applied as the Court shall order at a future stage of the proceedings.

EAST LONDON WATER-WORKS COMPANY.

Half-Yearly Report and Accounts.

The report which will be presented at the half-yearly meeting of the Company next Thursday states that, in the six months ending June 24, the new services laid on numbered 3060, as against 3594 in the corresponding period of last year—bringing the total up to 218,833. Good progress has been made in the construction of the two new storage reservoirs, and it is hoped that both will be completed before the end of the year. Supplementary filter-beds have been erected at the Hanworth pumping station. The Directors have, subject to the approval

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of the proprietors, made arrangements with the Secretary (Mr. I. A. Crookenden) by which his services will be retained until the final winding up of the Company, if the undertaking should be purchased under the terms of the Government Bill now before Parliament. A resolution will be submitted to the meeting approving these arrangements, which provide for his receiving a gratuity for extra services and a retiring pension. The accounts accompanying the report show that the revenue from all sources for the half year (including a balance of £4500 brought forward from the previous accounts) amounted to £197,785, as compared with £191,547 in 1901—being an increase of £6238. The expenditure on revenue account was £87,182, as against £92,180 last year, or a decrease of £2998. Had it not been for the fact that £1150 more was paid for water purchased from other Companies than in the corresponding half of the previous year, the expenditure would have shown a decrease of no less than £4148. The increase in the receipts from water-rates amounted to £7184. The balance available for division amounts to £89,995; and out of this the Directors recommend that a dividend on the ordinary stock at the rate of 8 per cent. per annum for the half year (less income-tax) be declared. This will absorb £68,822, and leave an unappropriated balance of £21,173 to be carried forward.

THE WATER SERVICE OF SHIPLEY.

Free Baths and Water Closets.

The District Council of Shipley are an ambitious body; and their aim has been to make the town second to none, among communities of the same size, in point of possessions. Their undertakings include the gas, electrical, and water works; and short references to these appeared in the paper that Mr. I. Lindow, the Clerk to the Council, read at a meeting of the Yorkshire district of the Association of Municipal and County Engineers at Shipley last Saturday week. There was little said by the author regarding the two first named enterprises; but in regard to the water undertaking, he had more to communicate.

It was, Mr. Lindow said, in 1849 that the then Local Authority obtained an Act empowering them to construct water-works, and thus giving them the right to supply what had now become a very large consumption of water. Further powers were obtained in an Act of 1874, and the storage reservoirs were increased to the extent of 95 million gallons, so that at present, with a storage capacity of nearly 140 million gallons, Shipley was provided with a storage equal (apart from compensation water) to 120 days' supply. The gathering-grounds, which comprise an area of more than 2000 acres, formed part of the far-famed Rombalds Moor common lands. Shipley people were extravagant users of water; the consumption per head of the population being over 30 gallons per day. Whereas the receipts from water used for domestic purposes had increased more than 20 per cent. during the past seven years, the income for trade consumption had actually gone down. In an industrial centre such as Shipley, this was no doubt exceptional; but it was due to the circumstance that manufacturers had availed themselves of the facilities for obtaining water from the canal and the river, and also by means of wells, the valley in which Shipley was situated providing a good supply of water for dyeing and other trade purposes. The want of elasticity in the income from water prevented the rates being benefited from that source; but the Council were enabled to encourage the use of water for sanitary purposes. In another sense the Shipley consumers had a right to congratulate themselves, because, whereas in most towns there was an extra charge made for baths and water-closets, householders in Shipley were entitled to one bath and one water-closet free, no extra charge being made for these on the ordinary scale charge for domestic purposes. It might be argued with some show of reason that free baths and water-closets were unfair to those consumers who had no such privileges, and who had therefore to accept the burden of providing for their more fortunate neighbours. An important consideration, however, was the encouragement which it gave builders to make healthy sanitary provisions, and new houses without baths and water-closets were now the exception. The expenditure on water-works account had been £125,000.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

When I wrote, two weeks ago, that the penultimate stage in the appointment of a Gas Manager by the Corporation of Dundee had been reached, I now know that I assumed a greater desire for expedition than the Corporation have manifested in this matter. My eyes were opened to this extent on Tuesday, when I read in a Dundee newspaper that the Town Council were to hold a special meeting that day to consider as to the filling up of the vacancy, because it was added: "It is unlikely that an appointment will be made just now. The question of salary is yet to be settled; and it is probable that the Council may wish to interview the candidates, either by asking them to come to Dundee, or by sending a deputation to visit the works where they are at present employed." I should, of course, have recollected that the salary to be paid was purposely left out of the advertisement inviting applications, as the Council wished to see the best men applying. I have heard it stated that a gentleman who is not a candidate was sounded as to whether he would accept the post at a salary of £800, but that the negotiation did not proceed. Is the amount of salary asked to be an element in the selection?

JOSEPH AIRD
GREAT-BRIDGE.
STAFFORDSHIRE.
TUBES
AND FITTINGS.
LONDON OFFICES: 46, QUEEN VICTORIA STREET, E.C.

Well, the Council met on Tuesday, and, after a discussion which is described as lively, they reduced the short list to five (whose names are given in a paragraph appearing elsewhere), and resolved to ask the gentlemen left in to wait upon the Council next Tuesday. The appointment may be made then; but, of course, it may be resolved to visit the works of the candidates, which would necessitate a further postponement.

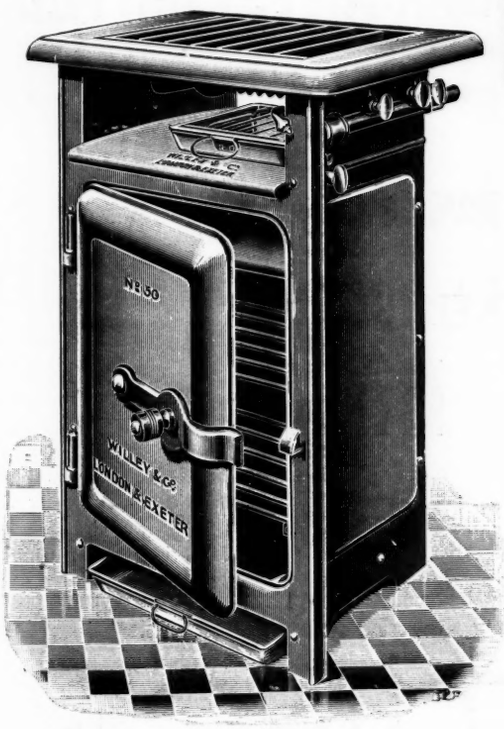
As to the meeting, one of the first things done was to resolve that the proceedings should be held in private, which was described by Mr. Speed as a stifling of free speech. But this having been agreed to, it was then resolved that each member should write out a list of five names, and should sign his voting-paper; the latter precaution being advocated by Mr. Brownlee, "so that in future no one could shirk responsibility." The Council allowed Mr. Brownlee to lead them in this matter, and the vote was so taken. As it was being taken, an unseemly incident occurred, initiated by Bailie Stevenson, who suggested that the candidates should be divided into two classes, those who were managers and those who were assistants. What good was to be effected by the division was not apparent; for it was not part of the suggestion that one of the classes should be rejected, although that would seem to have been the object, for Bailie Stevenson gave as his opinion that "owing to the position of gas matters at present, it would be most prudent only to deal with those who had had experience in management. It was necessary to have a man who would be able to look after the organization of the works and the commercial side of the department." Objection was taken to Bailie Stevenson's remarks, and, indeed, to anybody speaking at that time; and Mr. Ballingall, the Convener of the Gas Committee, protested that "it was a direct attempt to depreciate the efforts of an official in their employment," which it certainly was, as Bailie Stevenson himself made plain in a subsequent remark. The suggestion was a blow aimed at the candidature of Mr. Donald, who is at present carrying on the works. It had the effect of bringing an acknowledgment of Mr. Donald's merit from the lips of Mr. Ballingall, who said that Mr. Donald had been in the employment of the Commissioners for nine years as Assistant Manager, and "he thought Bailie Stevenson might have refrained from making so direct and pointed an attack on one of their officials, who had served the Corporation well and faithfully. Recently there had been an apparent improvement, both in the *personnel* of the staff and in the works themselves. Everything was going on as smoothly as could be expected; and he had noticed a considerable improvement on affairs all round."

Should the appointment be made next Tuesday, it will be over before these "Notes" are published. I therefore state now there are 28 councillors in Dundee; and whoever receives 15 votes will get the appointment. At first sight, it seems curious that not one of the five who have been selected came so low as 15; but it must be remembered that each councillor had five votes. There were 24 members present, which makes 120 votes in all. Of that number, 100 were given to the five who are now on the short list; leaving only twenty votes among the other four candidates. Some of them must have had very small support. The result of this preliminary vote is not of much help in estimating the chances of any particular individual. There is, however, much speculation upon the subject. One of the candidates whom I had a high expectation of is now out of it, which narrows the field of chance without disturbing that of probability. Unless the question of salary should rule it, I think there is little doubt as to who will get the appointment.

In my remarks last week upon the criticisms which had been made upon the quality of the gas supplied by the Corporation of Dundee, I stated that the critic seemed to have got his inspiration in churches. But poor light is better than none at all, which is what the Corporation electrical undertaking provided in a Dundee church on the evening of last Sunday. While the clergyman was reading the scripture lesson, the light went out. It was partially restored; but in fear of a second visitation, the service was curtailed. Surely here was an opportunity for a scathing article about the light; but, being electricity, the subject was dealt with in the newspaper in a sympathetic manner. There is no interest on the part of anyone to throw stones at the electrical undertaking, which is probably the explanation of the treatment of the positive electric failure being different from that of the assumed defect of the gas.

Though not much is being heard of it, it seems that the proposal of the Finance Committee of the Glasgow Corporation to issue 3 per cent. redeemable stock in exchange for 9 per cent. gas annuities is the subject of strong difference of opinion. Law agents recently held a meeting, at which they agreed that they could not advise their clients to accept the stock. Since then, it was stated in the Town Council that applications were coming in satisfactorily. Then a meeting of the Corporation was held last Monday, at which Treasurer Murray stated that the applications received for the stock were already in excess of the Corporation stock authorized and unissued; and he proposed that authority be granted for the creation of additional 3 per cent. redeemable stock to the amount of £500,000. While, he said, they were disappointed that more of the legal firms had not seen their way to recommend their clients to fall in with the scheme, they had reason to be satisfied with the measure of success which had so far been attained. They did not expect that the whole amount of the annuities would be converted at once. He saw that an attempt had been made on the Stock Exchange to run up the price of the gas annuities; but it was significant that, while they were receiving applications every day, not a single transaction had taken place in gas annuities since the scheme was announced. There was a considerable amount of talk in the Council on Monday, not all favourable to the scheme; but in the end, it was agreed to by a large majority.

A point upon which, thanks to Post Office delay, I had not information when I wrote the note last week with regard to the Greenock Corporation gas accounts, was that with reference to the repair of the gasholder. It will be remembered that a report was obtained to the effect that the holder would require an expenditure of £2300 upon the



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repair of it, to make it safe. The Manager (Mr. Ewing) thought this large outlay was unnecessary, and that a few trifling repairs were all that was needed. Several of the Gas Committee were afraid to take the responsibility of adopting the Manager's view of the matter, and they asked him to nominate a neutral man to examine and report on the holder. Mr. Ewing nominated Mr. T. Wilson, of Coatbridge. This gentleman's report was to the effect that the defects in the gas-holder were trifling. This satisfied the Gas Committee, who have accordingly authorized the slight repairs to be made by the Manager as he recommended. The Corporation, at the same meeting, adopted a suggestion by the Manager that a Maxim carburettor be procured, at a cost of about £400, for the enrichment of the gas.

The Valuation Appeal Courts have now all been held. So far as I have seen, the only gas undertaking the valuation of which was brought under review was that of the Huntly Gas Company. A new Assessor had raised the valuation from £200 to £430. The Solicitor who appeared for the Company said that the actual profit earned for the year was £593, which was subject to deductions which would bring the Company into the position of being £177 short of the amount they required to pay a 6½ per cent. dividend. The Assessor explained that his valuation was based (in accordance with the decision in the Kinross case) upon the profits earned; and the Court sustained the action of the Assessor.

The Corporation of Gourock have reduced the price of gas to consumers within the burgh from 4s. to 3s. 8d. per 1000 cubic feet.

At the present time, the interest which is being taken in gas matters in Perth is much above the normal. Indeed, if it is continued much longer, it will begin to be felt to be more embarrassing than entertaining or enlightening. The accounts of the department were published in this column a few weeks ago. Since then, Bailie Watson, the Convener of the Gas Committee, has prepared and circulated a statement upon the accounts. The first portion of the statement is largely a repetition of what is already known; but the remarks upon the Gas Stove Department are new. As it is believed that what trouble there is in Perth over gas-supply questions has arisen from the change which was made in the method of the hire and sale of gas-stoves, this part of the statement is interesting. Bailie Watson says that "considerable pressure had been put upon the department at the beginning of the financial year, owing to a large number of apparatus supplied previously not having been fitted. Sales during the year had been very satisfactory. The success of the hire-purchase system was also gratifying. The number of stoves disposed of in this way was 493, at a net cost of £751 18s. 1d., and would yield a return of £977 9s. 6d. by the end of the period. On May 15, 1901, there were 2338 stoves in use, and 925 had been fixed during the year, showing the total number in use at May 15 last to be 3263. Of the 925, 204 were on cash sale, 493 on hire purchase, 13 fixed with slot meter, and 215 on simple hire. The total number handled and fixed during the year was 1425. The capital account for the value of stoves in hand, &c., is stated at £9681 2s. 5d. In regard to the revenue account, the Convener deducts the £241 spent on old stoves, repairs, and maintenance from £505—the gas stove rental—and gives the balance of £264 as the surplus on the year's working. The estimated increase of gas sold with 2115 pieces of apparatus on hire last year was 16,294,470 cubic feet. At the end of this year, with 3263 pieces in use, the increase must be considerably more; and it is safe to assume that at least 25 million cubic feet are consumed through these agencies from which revenue is derived. Taken at 1s. 6d. per 1000 cubic feet, the profit amounts to £1875, which, with the surplus on the year's working, provides £2139 to meet interest, sinking fund, and depreciation charges. Consequently, allowing 10 per cent. for depreciation of the stoves in use, the net value of which may be taken at £8200, would absorb £820, and (say) 5 per cent. to cover interest and sinking fund charges, £410, leaves a margin of profit in favour of revenue of £928 19s. 10½d. In addition, £305, representing the increased discounts on stove purchases during the year, has to be added, and thus the gross profit of £1234 is shown on the year's operations in this department." A newspaper which publishes this, says that ex-Treasurer Chalmers, who has taken a great interest in the matter, at the Committee meeting the other evening said that this was a more extraordinary statement than even that of Mr. Newbigging. He was quite astonished at the Convener's figures; and he thought the best thing to do was to second Councillor Barlas's motion that some little time should be taken to consider the matter. Since then, Mr. Chalmers has gone fully into the accounts, and prepared and printed a statement, bringing out a very different result in regard to the much-vexed question of the Gas-Stove Department. It may be recollected that, at the ward meetings last November, the Gas Convener confidently stated that, by the transference of this department from Mr. John Macpherson to the Gas Manager, a great saving up to that date had resulted to the ratepayers. At the time when Bailie Watson proposed the alteration, ex-Treasurer Chalmers prophesied that there would be a considerable loss by the proposed change, and his remarks were received with sneers and incredulity. Mr. Macpherson disputed Bailie Watson's statements; and it resulted in these gentlemen each lodging £20 in the hands of the City Chamberlain, where the money lies till the question is determined. Ex-Treasurer Chalmers says that "as the memorandum submitted by the Gas Convener is difficult to follow, as well as decidedly misleading, he had thought it well to prepare a simple statement showing a comparison between the financial aspects of the department under Mr. John Macpherson's management and the management of Mr. M'Lusky. In 1900-1, under Mr. Macpherson, the revenue was £959 19s. 4d., consisting of £523 1s. 10d. of discounts and £436 17s. 6d. of gas-rental. The expenditure was £528 13s. 6d., leaving a net profit of £431 5s. 10d. At that time, the capital was £7189. In 1901-2, under Mr. M'Lusky, the revenue amounted to £1114 3s. 4d., including £609 9s. 3d. as discount and £504 14s. 1d. for gas-rental. The expenditure was £902 14s. 8d., leaving a net profit of £211 8s. 8l. on a capital of £9736. The expenditure in 1900-1 is set down as follows: Materials, £195 0s. 7d.; gas-fitters' wages, £322 5s. 1d.; and upkeep, carriage, &c., £10 7s. 10d. Last year, the corresponding items are put down at £145 15s. 11d.,

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£493 0s. 10d., and £53 5s. 2d. respectively; while £128 2s. 9d. is charged for extra clerks, £30 for rent of show-room, and £52 10s. for depreciation and new stoves."

The accounts, with the Auditor's certificate, were before the Town Council on Thursday for approval, when Councillor Macpherson took advantage of the opportunity to denounce the Gas Department. "In his opinion, it had not been economically nor satisfactorily worked, and the apparent surplus was not the result of genuine management, but in many respects attained in most unsatisfactory ways. The public looked for a much better quality of gas for public lighting than they received. They should also like to see gas for heating purposes got without the unexplainable and unexplained increase in the gas bills in the town for a particular quarter. If any department was misconducted, it was the Gas Department. The accounts had been passed; but the argument and figures which the Convener had brought in support had not been satisfactory to a great section of the community, and would be less satisfactory to the public." Bailie Watson, in reply, said that the Gas Department had passed through stormy days and meetings, and those were largely due to Mr. Macpherson. Mr. Macpherson need not think to gull the public, as they were against the *clique* who were fighting the Gas Department. The Stove Department, he maintained, could never be in a more satisfactory condition than it was under the Town Council. They should not play into the hands of any private individual, no matter though he was aided and abetted by a member of the Town Council. He thought it extraordinary that gentlemen should come there and make statements as to the Gas Department which they knew to be untrue. The gas-works were never in a better condition than at present, under the management of Mr. M'Lusky. They had passed through a period of trial, but they never had a better Manager.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Sept.* 27.

Sulphate of Ammonia.

Throughout the week there has been a quiet market, and quotations have declined to £12 per ton f.o.b. Hull, and £12 1s. 3d. to £12 3s. 9d. per ton f.o.b. Leith and Liverpool. Consumers abroad being unwilling to pay current prices, buying has again been mainly for covering September contracts; and, supplies being rather more abundant, demand has been barely sufficient to sustain prices. There has been large inquiry in the forward position; but the ideas of makers have been too high to admit of any important first-hand business. London, Beckton terms, is quoted £11 15s. per ton, for October-March, and Leith, ordinary terms, £11 17s. 6d. for the same period.

Nitrate of Soda.

This article is quiet but steady at 8s. 4½d. and 8s. 7½d. per cwt. on spot, for ordinary and refined qualities respectively. For spring delivery, there are sellers of ordinary quality at 8s. 7¼d. per cwt.

LONDON, *Sept.* 27.

Tar Products.

The improvement mentioned last week has been fairly well maintained, more business being done all round in the various articles. Pitch is very quiet for export; and it remains to be seen whether the present high prices will continue throughout the season. As regards carbolic, 1s. 8¼d. was declined for a considerable quantity for October delivery; but as against this, consumers refused to pay 1s. 8½d. for November-June. There is an improved inquiry for crystals; but manufacturers do not care to offer over next year, except at higher prices. There is certainly more inquiry for benzol; but at present prices are unchanged. Makers, however, will not contract over next year, except at a decided improvement in value. In anthracene, a little business is reported in high percentages, but only for fine qualities and for delivery all over next year. It is now more certain than ever that nothing but the very best makes will be entertained by consumers. Toluol and solvent are in a very depressed state. There does not seem to be any sign of improvement in either article.

The average values during the week were: Tar, 18s. 6d. to 23s. 6d. Pitch, London, 53s. to 54s.; east coast, 49s. 6d. to 50s. 6d.; west coast, 46s. 6d. to 47s. 6d. Benzol, 90 per cent., 8d.; 50 to 90 per cent., 7¼d. Toluol, 7d. Crude naphtha, 2⅛d. to 2⅜d.; solvent naphtha, 7½d. to 8d.; heavy naphtha, 9d. Creosote, London, 1⅜d. to 1½d.; North, 1⅛d. to 1 5/16d. Heavy oils, 1¼d. Carbolic acid, 60 per cent., 1s. 8¼d. to 1s. 8½d. Naphthalene, 30s. to 40s.; salts, 20s. to 22s. 6d. Anthracene, "A," 1½d. to 1¾d.; "B," 1d. nominal.

Sulphate of Ammonia.

The market is quiet so far as forward delivery is concerned; but for prompt there is a strong demand, especially for the first half of October, for which period the Gaslight and Coke Company quote £12 2s. 6d., while for the last half £11 18s. 9d. is their current price. For October-March, their quotation is still £11 15s. Business has been done in Hull at £12 1s. 3d. for prompt; but for all October £12 would be accepted. In Leith, the market appears quiet, and scarcely any transactions are reported. Makers ask £12 2s. 6d.; but consumers will not pay this price, and offer only £12 for early October. The market, however, closes fairly steady, more especially for early delivery.

At the meeting of the Rickmansworth District Council last Thursday, the Clerk was authorized to employ Parliamentary Agents for the preparation of the Council's Bill for the purchase of the undertaking of the Rickmansworth Gas Company.

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COAL TRADE REPORTS.

Lancashire Coal Trade.

The month closes with no generally quotable change in prices, and little or no material alteration in the position since our last report. For house fire qualities, there has been more inquiry, consumers probably in many cases being anxious to get in supplies in anticipation of any possible advance on the 1st of October. The question of some upward move in prices has been under consideration by the leading colliery owners in this district; but, with pits not yet on full time and the output not more than sufficient to meet requirements, there is naturally a good deal of hesitation about advancing list rates until some real justification for such a step is afforded by the market. Prices at the pit are firm at 13s. 6d. to 14s. per ton for best Wigan Arley, 12s. to 12s. 6d. for Pemberton four feet and seconds Arley, and 9s. 6d. to 10s. for common house coal. The lower qualities of round coal still move away but moderately for iron-making, steam, and general manufacturing purposes, and for these prices are not more than steady at late rates, averaging 8s. 6d. to 9s. at the pit. Shipping also continues indifferent, and steam coals, delivered at the Mersey ports, can be brought about 9s. 6d. to 10s. per ton. Of engine fuel, there are continued fairly plentiful supplies on the market, chiefly in the medium and lower sorts. The position, however, varies considerably at different collieries, some of them moving off their present production, while at others slack is hanging, with stock slightly accumulating. There is also a good deal of slack now coming forward from outside districts, which is competing with local supplies. The better qualities remain firm at about 6s. 6d. up to 7s. per ton at the pit for the best descriptions, with medium sorts about 6s. Common varieties of slack, which have to meet competition from outside, are perhaps not quite so strong, but without quotable change at about 4s. 9d to 5s. at the pit, with Derbyshire slack to be bought in that district at from 2s. 6d. to 3s. 6d., according to quality.

Northern Coal Trade.

There is a strong demand for best qualities of coals, both steam and gas; but for second-class kinds the prices are weakened—the demand being only moderate. Best Northumbrian steam coals are steady at 11s. 6d. per ton f.o.b., second-class steam vary from 9s. to 10s., and steam smalls are 5s. to 5s. 3d. The collieries seem for the present to have plenty of work, but without any great pressure in the demand. In gas coals, there is an increase in the demand, which will manifest itself more as the days shorten. The contract quantities sent on are increasing, and the demand enlarges, more especially for best coals; but it is well met, though there may be less surplus coals for occasional sales. The prices of Durham gas coals vary from 9s. to 10s. per ton f.o.b., according to quality. Gas coke is steady and unaltered at last week's prices.

Scotch Coal Trade.

There is said to be already a better tone in the market, following upon the decision to reduce wages, inquiries being more ample. The miners are working steadily; and there is thus a large output. The prices quoted are: Main 8s. 3d. to 8s. 6d. per ton f.o.b. Glasgow, ell 9s. 3d. to 10s. 3d., and splint 9s. 6d. to 9s. 9d. The shipments for the week amounted to 225,126 tons—a decrease of 20,719 tons upon the preceding week, but an increase of 30,462 tons upon the corresponding week of last year. For the year to date, the total shipments have been 7,662,093 tons—an increase of 535,877 tons upon the same period of last year.

Shipley's Assurance to Baildon.—A deputation from the Baildon District Council who waited upon the Gas Committee of the Shipley District Council a few days since to request a reduction in the price of gas used for lighting the streets, pointed out that Baildon was paying at the rate of 3s. 1d. per 1000 cubic feet—the same as was paid by Shipley consumers, but that, if a profit were made and applied to the relief of the rates of Shipley, the ratepayers of Baildon would, in effect, be taxed for the benefit of the ratepayers of their neighbours in Shipley. An assurance was given by the Chairman of the Gas Committee (Mr. James Roberts) that the matter should be inquired into, with the view to a new agreement, if necessary; but that if the working of the gas-works resulted in profit to the Shipley Council, the profits should be used in the reduction of the price of gas, and would not be taken in reduction of the rates of Shipley alone.

Price of Gas at Rochdale.—The Merchants and Tradesmen's Association of Rochdale recently passed a resolution requesting the Corporation Gas and Electricity Committee to consider the question of a reduction in the price charged for gas. The resolution was read at a recent meeting of the Committee; but in the end it was considered that the time was not opportune for making a reduction. Mentioning the matter at the last meeting of the Association, the President (Mr. Councillor Sharp) said every member of the Gas Committee thought the price should be reduced, but that this was not an opportune time to make a reduction. The reason was the rates were likely to be higher next year, and some of the ratepayers did not pay towards the increase excepting through their gas bills. The discussion of the subject was not pursued to any length. Mr. Sharp, however, gave notice of his intention to move at the next meeting of the Town Council that the price of gas for lighting purposes be reduced from 3s. 2d. to 2s. 11d. per 1000 cubic feet, and that for heating the price be 2s. instead of 2s. 3d. His notice of motion also provides that the discount be the same on accounts for gas for heating purposes as for lighting, and that, if carried, the reduction shall come into operation from the end of the September quarter. The charge was advanced 3d. per 1000 cubic feet when the last large rise in the price of coal took place; and now that the cost of coal has been reduced again, there is a strong feeling that the price of gas should also be lowered to the old figure.

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Altering the Basis of the Water Charge at Wallasey.—Supported by the Parliamentary Committee, the Water Committee advised the Wallasey District Council last Tuesday to apply to the Local Government Board for a Provisional Order permitting the Council to increase the maximum percentage for the water-rate beyond the prevailing £6 per cent., and to charge on the gross estimated rental instead of the annual value of each house. The Chairman (Dr. Oldershaw) explained that at present they could only charge 6 per cent. on the assessment for water for domestic purposes; and they found the return would not be sufficient to meet the new charges. These comprised the interest and sinking fund on the new pipe-line, and would amount to some thousands per annum. The recommendation was adopted.

Quality of Southport Water.—At the meeting of the Southport Town Council on Tuesday evening, a report was presented by Dr. Thresh on a sample of water taken from the mains of Southport. The Analyst stated that no purer water occurred in Nature, and its exceptional quality entitled it to the highest rank as a public supply. Dr. Wilshaw said he defied anyone in Southport to point out a knock-kneed or bow-legged child; and he thought this was to a great extent due to the water and was an advantage in disguise. In Glasgow and other places where the water was free from hardness or was of little hardness, the number of rickety children was phenomenal. Alderman Griffiths, Chairman of the Southport, Birkdale, and West Lancashire Water Board, said he supposed the Council wished to see whether the present Water Board were supplying pure water for the town. With the exception of its hardness, there was no water in the kingdom so good as that of Southport.

Well Done, Saltley!—All the men who left the Saltley (Birmingham) Gas-Works for the front shortly after the outbreak of the war in South Africa have returned, excepting one who died from fever; and, in consequence, the Committee of the Works Reservists' Fund have decided that the contribution of 1d. per week per man, which had been made for the past two years, should be discontinued and that the fund should be closed. A meeting of the subscribers to the fund was held last Tuesday (Mr. Henry Hack in the chair) to consider the proposals of the Committee as to the disposal of the balance of the fund in hand. The statement showed that £570 had been contributed, out of which £486 had been distributed to the wives and other relations dependent upon the reservists—the number of recipients being 23, and the amount given averaging £21 2s. 9d. each. In laying these figures before the meeting Mr. Hack said that out of the men who left for the front fourteen had applied for, and had been allowed to resume, work. The others were on sick furlough, but they could rely upon employment being given to them when they made application. After discussion, it was resolved that a grant of £25 be made to the widowed mother of Frank Weaver, the man who died of fever; that a grant of £20 be made to the purchase fund of the Marle Hall Convalescent Home; and the remainder—£39 3s. 10d.—be transferred to the works benevolent fund.

Leamington Priors Gas Company.—The report which was presented at the recent half-yearly general meeting of the Leamington Priors Gas Company showed that during the past six months there had been an increase of 4 per cent. in the sale of gas. It was recommended that the usual dividends be declared—namely, upon the "A" shares at the rate of 10 per cent. per annum, and upon the "B" shares at the rate of 7 per cent. per annum, less income-tax. The Leamington Corporation Act, 1902, received the Royal Assent on July 22 last. A clause in it repeals the power of the Corporation to purchase the undertaking, and places the Company in exactly the same position as they were before receiving the notice to purchase from the Council.

Exmouth Gas Company.—In moving the adoption of the report and accounts at the half-yearly meeting of the Exmouth Gas Company last Tuesday, the Chairman (Mr. J. Palmer) said that during the six months 20,965,000 cubic feet of gas had been consumed, which was an increase of 139,000 cubic feet over the corresponding period of the previous year. The increase of consumers was 122; and there were 30 more gas-stoves in use. The sum available for dividend was £722, against £380 the previous half year. The increase was due chiefly to the lower price of coals and the additional consumption. Mr. H. A. Willey, in reference to a question put by the Rev. C. R. Carr, said the introduction of the electric light would for the first year cause the consumption of gas to be stationary, but an increase would be sure to follow. It would be wise for the District Council to arrange with the Gas Company for the use of their Provisional Order, rather than let outsiders have it, because gas was the cheapest fuel for working dynamos—far cheaper than coal. He had proved this by experience. The report was adopted.

Water Supply of Hayfield.—Last Tuesday, Major Stewart, on behalf of the Local Government Board, held an inquiry at Hayfield into the application of the Rural District Council to borrow £6492 for the purpose of providing a public water supply. Mr. J. R. Bowden, the Clerk to the Council, explained the facts with regard to the Council's opposition to the Bill of the Stockport Corporation. He said the Corporation went to Parliament with a Bill to acquire the waters of Kinder, in the parish of Hayfield; and as this seriously interfered with the Council's scheme, they opposed the measure in its passage through Parliament, and succeeded in getting very satisfactory terms. They procured the insertion of a clause requiring the Corporation to provide 100,000 gallons per day for Hayfield at the rate of 4½d. per 1000 gallons, or at cost price. The opposition cost £1492; and the Council's scheme was to procure water from a spring that had been acquired by Stockport, and convey it to Hayfield. If the loan was not granted, the Council would be compelled to levy a special rate of 2s. 6d. in the pound to defray the cost of opposing Stockport. Dr. Bennett, of Buxton, Medical Officer of Health, having given evidence in support of the application, the inquiry closed; several ratepayers withdrawing their opposition.

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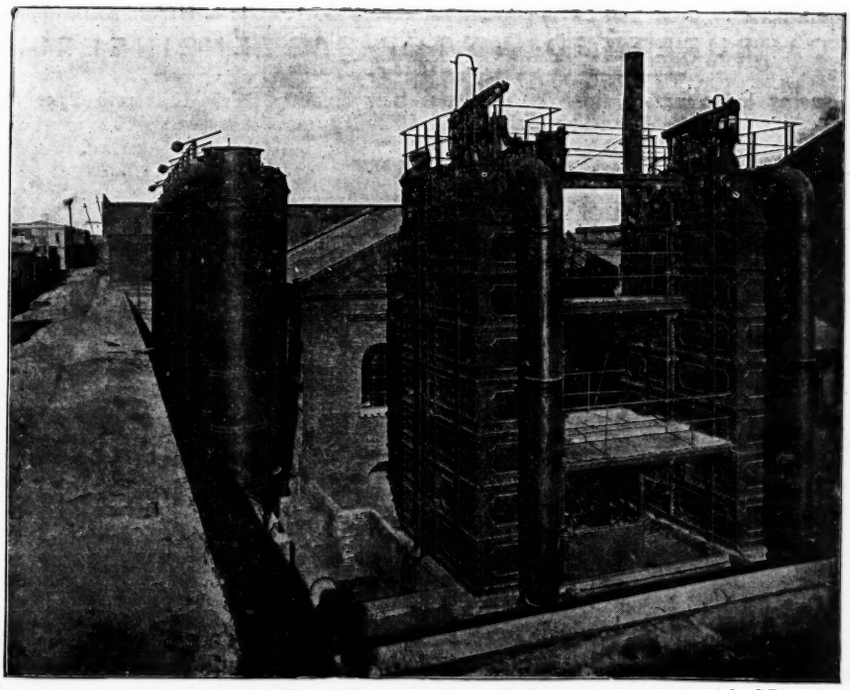

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WALKER'S PATENT CONDENSER AND PURIFYING-MACHINE AT SANTIAGO GAS-WORKS.

The Late Mr. E. W. T. Richmond and his Representatives.—A meeting of the travellers and managerial heads of departments connected with the Richmond Gas Stove and Meter Company, Ltd., was held at Warrington on Thursday last, under the presidency of the new Managing-Director, Mr. Horace M. Thornton. The object of the meeting was, primarily, to discuss plans for the future working of the business, and to continue the intimate friendship and opportunity for conference between the new management and the representatives, the efficacy of which in commercial life was a strongly rooted belief of the late Mr. Richmond. It must have been very gratifying to the Directors present (Mr. Glover, Mr. Ransome, and Mr. Thornton) to see and hear the expressions of loyalty and determination on everybody's part to "push" and "keep pushing" the business with the energy and progressiveness that were characteristic of the late chief. In opening the meeting, Mr. Thornton paid a warm tribute to their departed friend, and a letter of condolence, signed by all present, was forwarded to Mrs. Richmond. It was also decided to place in Darley Dale Church a stained glass window, with a suitable inscription, to perpetuate the memory of Mr. Richmond; and a Committee was appointed for the purpose of getting designs. About £100 was subscribed in the room among the sixteen Directors, Managers, and travellers present; so that a handsome memorial is already assured. All branches of the employees are going to contribute.

Mond Gas-Works Progress.—The site for the central generation station of the Mond Gas Company has been fixed upon. At a meeting in London last Friday, the plans for the new buildings, &c., at Dudley Port were finally approved; and the Power Gas Corporation were empowered to proceed with their contract for the erection of the works as speedily as possible. No less than seven sites for the central generating station were scheduled in the Mond Gas Bill; but after a careful consideration of the collective merits of each, it was found that the one at Tipton possessed by far the greatest advantages for commencing the Company's operations. The site consists of some 22 acres at Dudley Port, with an additional acreage of mines which will ensure lateral support to the buildings to be erected. It has a frontage to the main line of the London and North-Western Railway of about 270 yards, to Dixon's branch of the Birmingham Canal of about 165 yards, is within a few minutes' walk of Dudley Port station, and ten minutes by water of three railway goods stations, and adjoins the Tipton Gas-Works. The great merit of the site is its geographical position, being absolutely in the centre of the area over which the Mond Company have parliamentary powers, extending to 123 miles. The rateable values of 2300 works and manufactories using heat and power throughout the whole of this area have been ascertained; and, making a calculation on this basis and on their geographical positions, the site of the Mond Gas-Works have been described as being the "centre of gravitation" of these industries. The total cost of the works and pipe connections will probably amount to £250,000 sterling; and it is expected that the Company will be in a position to commence the distribution of gas in about two years.

The "Daily Graphic" for Tuesday last contained an interesting illustrated description of the work which is at present being carried on at Heathfield by the Natural Gas Company; and this was followed on Friday by articles in the "Engineer" and the "Pall Mall Gazette," dealing with the same subject.

Among the new Companies registered, we notice the Dibdin-Woltereck Process Development Company, Limited, which has been formed with a capital of £100 in £1 shares, to carry on the business of manufacturers and suppliers of gas, &c. The process was described in the "JOURNAL" for the 26th ult. (p. 569).

The Barnsley Town Council have accepted the tender of Messrs. Hodgson and Sons, of Nottingham, for the construction of filter-beds at the new Midhope Water-Works now in course of construction. The price is £17,968. The original estimate was £28,000; but the Corporation find they can do without one of the beds at present.

We learn that Messrs. John Harper and Co., Limited, of Albion Works, Willenhall, Staffs., have been licensed by the Welsbach Incandescent Gas-Light Company as sole manufacturers of the Welsbach-Kern gas radiators introduced last year. The firm have issued a revised price list containing particulars and illustrations of the various forms in which these radiators are sold.

The new water-works which have been in progress at Melton Mowbray for some months have now been completed; and the water has been turned on for the use of the inhabitants. It is pronounced to be of excellent quality; and there is every prospect of the scarcity of water which has been such a sore point at Melton for so long being for the future nothing more than a matter of remembrance.

We have received from the Gandy Belt Manufacturing Company (1901), Limited, copies of a new pamphlet issued by the firm on the question of belt driving and the proper care of belts. This contains a lot of information respecting the Company's speciality—the "Gandy" belt—as well as some formulæ which are certain to be found useful by all those who are in any way connected with driving machinery.

With reference to the recent accident at Carlisle, the Gas-Works Sub-Committee have accepted the tender of Messrs. Clayton, Sons, and Co., Limited, of Leeds, for the supply and erection of a new iron roof for the principal retort-house, at a cost of £314 10s. In addition to this, extras will have to be incurred to the extent of £30 or £40; and there will be the cost of slating the roof, which may amount to £150.

Messrs. Joseph Taylor and Co., of Bolton, have received orders for solid plate-lead saturators, with double detachable ammonia pipes and detachable acid pipe, lead lips, and braced with stout pitch pine laggings, from the Radcliffe and Pilkington Gas Company, the Ilford Gas Company, and the Brentwood Gas Company; also for a timber-cased saturator, with detachable ammonia and acid pipes, and double apron and top, from the Carnarvon Corporation.

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WINDSOR ST. WORKS, BIRMINGHAM	2,000,000
SALTLEY WORKS, BIRMINGHAM	2,000,000
COLCHESTER	300,000
BIRKENHEAD	2,250,000
SWINDON (New Swindon Gas Co.)	120,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000
WINDSOR ST., BIRMINGHAM (Second Contract)	2,000,000
HALIFAX	1,000,000
TORONTO	250,000
OTTAWA	250,000
LINDSAY (Remodelled)	125,000
MONTREAL	500,000
TORONTO (Second Contract; Remodelled)	2,000,000
BELLEVILLE	250,000
OTTAWA (Second Contract)	250,000
BRANTFORD (Remodelled)	200,000
ST. CATHERINES (Remodelled)	250,000
KINGSTON, PA.	125,000
PETERBOROUGH, ONT.	250,000
WILKESBARRE, PA.	750,000
ST. CATHERINES (Second Contract)	250,000
BUFFALO, N.Y.	2,000,000
WINNIPEG, MAN.	500,000
COLCHESTER (Second Contract)	300,000
YORK	750,000
ROCHESTER	500,000
KINGSTON, ONT.	300,000
CRYSTAL PALACE DISTRICT	2,000,000
DULUTH, MINN.	300,000
CATERHAM	150,000
LEICESTER	2,000,000
ENSCHEDE (HOLLAND)	150,000
BUENOS AYRES (RIVER PLATE CO.)	700,000
BURNLEY	1,500,000
KINGSTON-ON-THAMES	1,750,000
ACCRINGTON	500,000
TONBRIDGE	300,000
STRETFORD	500,000
OLDBURY	300,000
TODMORDEN	500,000
SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
YORK (Second Contract)	750,000
ROCHESTER (Second Contract)	500,000
NEWPORT (MON.)	250,000
TOKIO, JAPAN	1,000,000
PERNAMBUCO (Brazil)	125,000
MALTON	150,000
DULUTH, MINN. (Second Contract)	300,000

Complete Gas-Works at NELSON, BRITISH COLUMBIA.

LEEDS, 1,800,000 Cub. Ft. SMETHWICK, 500,000 Cub. Ft. LEICESTER (2nd Cont.), 1,000,000 Cub. Ft.
GRAVESEND, 300,000 C. Ft. BROCKVILLE (ONT.), 250,000 C. Ft. NEWPORT, MON. (2nd Cont.), 250,000 C. Ft.

WANTED, FOR SALE, AND CONTRACT ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

SITUATIONS VACANT.

ASSISTANT-ENGINEER. Melbourne Gas Company. Oct 31.
DRAUGHTSMAN. No. 3916.
DRAUGHTSMAN. No. 3918.
ENGINEER AND MANAGER. Ilford Gas Company. Oct. 11.
GAS-FITTER. Godalming Gas Company.
GAS FITTER. Sunbury Gas Company.
GAS-FITTERS. Ilford Gas Company.
GENERAL FOREMAN. Midland District. No. 3914.
GENERAL FOREMAN. (Works making 150 millions.) No. 3919.
LAMP SUPERINTENDENT. Newcastle Gas Company. Oct. 3.
WORKING FOREMAN. Devizes Gas Department.
WORKING MANAGER. Beccles Gas Company.

SITUATIONS WANTED.

MAIN AND SERVICE LAYER, &c. No. 3917.
SMITH, GENERAL FITTER, &c. No. 3920.

PLANT, &c. (Second-Hand), FOR SALE.

EXHAUSTER AND GASHOLDERS (various). Wright, London.
PURIFIERS. Mablethorpe Gas-Works.
PURIFIERS, SCRUBBER-WASHERS, GASHOLDERS, &c. Firth Blakeley, Dewsbury.

SALES OF STOCKS AND SHARES.

ILFORD GAS COMPANY. Oct. 21.
LITTLEHAMPTON GAS COMPANY. Oct. 7.
LOWESTOFT WATER AND GAS COMPANY. Oct. 21.
NEWCASTLE AND GATESHEAD WATER COMPANY. Oct. 14.
READING GAS COMPANY. Oct. 9.
SOUTH ESSEX WATER COMPANY. Oct. 21.

TENDERS FOR

BENZOL.

ROCHDALE GAS DEPARTMENT. 20,000 gallons. Tenders by Oct. 8.

BUILDING AND IRON AND STEEL WORK.

ARDROSSAN GAS DEPARTMENT. Tenders by Oct. 9.

COKE.

PINNER GAS COMPANY.

GASHOLDER AND TANK.

GUERNSEY GAS COMPANY.

INCLINED RETORT PLANT (Complete.)

BURTON-ON-TRENT GAS DEPARTMENT. Tenders by Nov. 28.

MACHINERY.

ARDROSSAN GAS DEPARTMENT. Tenders by Oct 9.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

One Year, 21s.; Half Year, 10s. 6d.; Quarter, 6s. 6d.

Payable in Advance. If credit is taken, the charge is 25s. a year.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.

JOHN WM. O'NEILL, Managing Director,
160, 161, & 162, PALMERSTON HOUSE,
OLD BROAD STREET,
LONDON, E.C.

ANDREW STEPHENSON, AGENT. All communications RE OXIDE to the COMPANY as above.

WINKELMANN'S

"VOLCANIC" FIRE CEMENT.

Resists 4500° Fahr. Best for GAS-WORKS.

ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

BROTHERTON & CO., LIMITED.

Offices: Commercial Buildings, LEEDS. Correspondence invited.

PENNY-IN-THE-SLOT WORK.

H. GREENE & SONS, Ltd., are pre- pared to give QUOTATIONS to Gas Companies or Corporations for FITTING UP COMPLETE and CARRYING OUT the WORK in its entirety, either in Iron or Compo.

19, FARRINGDON ROAD, LONDON, E.C.
Telegrams: "LUMINOSITY."

HYDRATED OXIDE OF IRON.

PREPARED from Pure Iron.

Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.

READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

AMMONIACAL LIQUOR wanted.

BROTHERTON AND CO., LTD., Ammonia Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

NEW GAS PLANT CEMENT.

JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.

For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E.

First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.

Telegraphic Addresses:
"Braddock, Oldham." "Metrique, London."

DUTCH OXIDE OF IRON.

EERSTE Hollandsche Yzererts Maaty (First Dutch Bog Ore Company, Ltd.), ROTTERDAM.

General Manager (for England and Wales)—
CHARLES E. FRY, Leamington; and at Tower Chambers, Brown Street, MANCHESTER.

London Managers—
E. PADFIELD & CO., 96-98, Leadenhall Street, LONDON, E.C.

General Manager (for Scotland)—
J. B. MACDERMOTT, 11, Bothwell St., GLASGOW.

SULPHURIC ACID for Sale.

BROTHERTON AND CO., LTD., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

TO GAS AND WATER OFFICIALS.

HIGHEST Grade Cycles, "Premiers," "Court Royals," "Triumphs," "Humbers," "Swifts," "Centaurs," and all best and choicest Coventry Manufactures on SPECIAL TERMS to GAS and WATER OFFICIALS. Agents Wanted.

Apply to the MANAGER, Imperial Cycle Supply Company, COVENTRY.

PATENTS AND TRADE MARKS PUBLICATIONS. "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; "SUBJECT-MATTER of PATENTS," 6d.

MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 and 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 248 Holborn.

PROVINCIAL Gas Companies may pro- fitably consider the advantages offered by ACETYLENE for the PUBLIC and PRIVATE LIGHTING of OUTLYING PORTIONS OF THEIR DISTRICTS, which do not at present justify the expense of laying Coal-Gas Mains from the Central Works.

Correspondence on this subject is invited by the ACETYLENE ILLUMINATING COMPANY, LIMITED, 8, Victoria Street, LONDON, S.W.

COAL GAS TAR wanted.

State Quantity to offer for Prompt and Forward Delivery.

The SHARPNESS CHEMICAL COMPANY, Tar Distillers, Sharpness Docks, GLOS.

OXIDE OF IRON.

FIRE Cement, Paint, Mains, Tubes, STREET LANTERNS, GLASS, TOOLS, &c.
BALE & CHURCH,
5, CROOKED LANE, CANNON STREET,
LONDON, E.C.

LIME
FOR GAS PURIFICATION.

THE DUNSTABLE LIME COMPANY,

Works: Sewell, Dunstable, Knebworth, Stamford, and Peterborough, Great Northern, Midland, and London and North-Western Railways.

Copy of Analysis of Lime from Knebworth Works—

Calcium Oxide (Quick Lime) . .	98·9
Magnesia and Alumina	0·5
Silica	0·6
	100·0

Head Office: PETERBOROUGH.

GAS TAR wanted.

BROTHERTON AND CO., LTD., Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SULPHATE OF AMMONIA

SATURATORS and LEAD WORK for Sulphate of Ammonia Plants.

For REPAIRS or ALTERATIONS, ring up "0848 BOLTON," or Telegraph "SATURATORS, BOLTON."

Largest Practice and most Up-to-Date Works in Britain.

JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.

IT is worth your while to buy direct. THE RELIANCE LUBRICATING OIL COMPANY 19 and 20, Water Lane, Great Tower Street, London, E.C., handle all kinds of Lubricating Oils, for Engines, Cylinders, Dynamos, Spindles, &c., Burning Oils, Solar Distillates, Carburetting Oils, and Spirits for Gas Making; Motor Oils, Fuel Oils, Animal, Fish, and Vegetable Oils, &c., for all purposes. Write for our "Trade Mark" Inkstand, sent free to customers. Non-customers, 2s. 6d. each. RELIANCE LUBRICATING OIL COMPANY, London, Glasgow, Newcastle-on-Tyne, &c. Established 1858. Telegraphic Address: "Subastral," London; A.B.C. Code used. Telephone No.: Avenue 5891.

TO GAS AND WATER OFFICIALS.

HIGH CLASS CYCLES at lowest Prices guaranteed and sent on APPROVAL for Cash or GRADUAL PAYMENTS. Catalogue and Testimonials from Gas Managers post free.
MELROSE CYCLE COMPANY, COVENTRY.

YOUNG Man (aged 24) seeks engagement as SMITH, and to do General Fitting about Works and Main and Service Laying. If small Works, would make himself generally useful. Good References.
Address No. 3920, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Situation as Main and SERVICE LAYER. Has had experience in Plumbing, Meter and Stove Fixing, and Slot Work and Gas and Water Fitting.
Address No. 3917, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS FITTER Wanted. Must be well up in Iron and Compo, Mains, Services, Meter Reading, &c. Wages, 32s. per week.
Apply, by letter, to the MANAGER, Gas-Works, SUNBURY-ON-THAMES.

GAS-FITTER Wanted. Preference given to a Man with experience in the Maintenance of Incandescent Burners. Wages 30s. per week.
Apply to BENJAMIN BARK, Gas-Works, GODALMING.

ENGINEERING and Architectural DRAUGHTSMAN wanted, with a good knowledge of Gas-Works Plant.
Apply, by letter, stating Experience, Age, and Salary required, to No. 3916, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Working Manager for a Small Country Works making 2 million cubic feet. House provided on the Works, with Coal and Gas.
Apply, by letter, stating Wages required, to
W. METHVEN,
Engineer and Manager.
Gas-Works, Beccles.

WANTED, a Good Draughtsman, thoroughly conversant with all kinds of apparatus for the Manufacture of Gas, also Conveying and Elevating Machinery. Must be capable of estimating Quantities and proficient in the preparation of detail Drawings.
Apply, by letter, stating Age and Salary required, to No. 3918, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GENERAL Foreman Wanted for a Gas- Works making about 150 million cubic feet. Must have had experience in the control of Men, the working of Carburetted Water-Gas Plant, and Testing Gas for Illuminating Power and Purity. Mechanical Training preferred.
Apply, by letter, stating Age, Qualifications, References, and Wages required, to No. 3919, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GENERAL Foreman Wanted, under Superintendent at a large Gas-Works in the Midlands, to live on the Works (at a rental). Must be experienced in modern methods of Carbonization and Purification, and with up-to-date Gas-Works Plant and Machinery, including Carburetted Water-Gas Plant. Mechanical training preferred.
Wages to commence at £3 5s. per week.
For further Particulars, apply by letter, stating Age, Qualifications, and References, &c., to No. 3914, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED A WORKING FOREMAN.

THE Gas and Water Committee of the Devizes Urban District Council are in want of a Man who is willing to make himself generally useful as WORKING FOREMAN in their Gas-Works. It is desirable that he should have a knowledge of Fitting Work, and be capable, under superintendence, of doing any such work about a Gas-Works. Also some knowledge of Carbonizing and Carbonizing Plant, Purifying, and other Gas-Works Routine would be preferred.
Apply, stating Age and Wages required, to
J. W. HOLLOWAY,
Manager.
Gas-Works, Devizes, Wilts.

ILFORD GAS COMPANY.

ENGINEER AND GAS MANAGER.

THE Directors of the above Company require the services of an experienced Man (technically educated) as ENGINEER and GAS MANAGER. Present make about 180 million cubic feet per annum.
The person to be appointed must have a thorough knowledge of Gas-Making in all its branches, the Testing of Coal and Products, and the Treatment of Residuals. He must have a good knowledge of Engineering and Chemistry, and have had experience in the Design and Construction of modern and up-to-date Gas-Works Plant, and also be experienced in the practical working of Inclined Retorts and Water-Gas Plant.
An Assistant Manager resides on the Works.
The Salary will be £400 per annum (no house or extras).
Particulars of the Duties and Conditions of Appointment may be had on application to the undersigned.
Applications, stating Age, Experience, and when prepared to take up Duties, together with *copies* of not more than Three recent Testimonials, to be sent to me, on or before Saturday, Oct. 11, endorsed "Application."
Canvassing will disqualify.
By order,
H. W. ASHMOLE,
Secretary.
Ilford, Sept. 16, 1902.

WANTED, immediately, experienced Gas-Fitters. Must are accustomed to fixing Gas-Cookers, Gas-Fires, Incandescent Burners, and General House Fitting.
Apply, stating Experience and Wages required, enclosing *copies* of Testimonials, to J. H. BROWN, Engineer and Manager, Gas-Works, ILFORD.

THE Newcastle-upon-Tyne and Gates- head Gas Company require a SUPERINTENDENT for their Public Lamp Department. Applicants must have had previous experience.
Applications to be made, on or before the 3rd of October, in Candidate's own Writing, stating Age, Salary required, and giving Particulars of Experience, with *copies* of recent Testimonials, to
THOS. WADDOM,
Secretary.
35, Grainger Street West,
Newcastle-upon-Tyne.

METROPOLITAN GAS COMPANY, MELBOURNE, AUSTRALIA.

(OUTPUT ABOUT 1200 MILLIONS).

ASSISTANT-ENGINEER required for the above Company. Salary about £650, no allowances.
Further Particulars, if required, can be obtained by applying (by letter only) to John Terry and Co., at the under-mentioned Address.
Applicants must be in perfect Health, Energetic, and thoroughly trained in latest Scientific Methods.
Applications, stating Age, Salary required, Qualifications, and Experience, and giving personal References, must be sent in before the 31st of October," to "CHAIRMAN," care of JOHN TERRY & Co., 7, GREAT WINCHESTER STREET, E.C.

FOR SALE—Two 5 ft. square Purifiers, Four Layers Wood Grids, two 4-inch Four-Way Valves, and 4-inch Connections. In good working order. Tenders invited.
Apply to the GAS-WORKS, MABLETHORPE, S.O.

GAS OIL for Carburetting Water Gas. Same as supplied to several important Gas Undertakings.
Inquiry invited by W. H. HARVEY, 27, Leadenhall Street, LONDON, E.C.

TO BE SOLD—
EXHAUSTING PLANT, complete with Engine and Boiler, for 3000 to 4000 feet per hour.
GASHOLDER, 16 ft. by 10 ft. with 4 Columns.
GASHOLDER, 20 ft. by 10 ft. with 4 Columns and Suspension.
GASHOLDER, 45 ft. by 14 ft. with 5 Columns and Two Lift.
Write J. WRIGHT, 181, Queen Victoria Street, E.C.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

TENDERS invited for all the surplus GAS COKE made by the Pinner Gas Company, Limited, at their works. Sixty to 100 Tons on hand.
Apply to the MANAGER, Gas-Works, PINNER.

GUERNSEY GASLIGHT COMPANY.

THE Directors of the above Company are prepared to receive TENDERS for the erection of a TWO-LIFT GASHOLDER and STEEL TANK, the lower Lift to be 100 ft. diameter by 25 ft. deep.
Further Particulars may be obtained on application to the Manager.
Tenders, Plans, and Specifications to be addressed to the Chairman.
THOS. CROSSLEY,
Engineer and Manager.
Gas-Works, Guernsey,
Sept. 15, 1902.

TO GAS-WORKS CONTRACTORS.

THE Town Council of Ardrossan invite TENDERS for the EXCAVATOR, BRICK and MASON, JOINER, PLUMBER, SLATER, and PLASTER WORK, and also for the IRON and STEEL WORK and MACHINERY for proposed New Gas-Works to be Erected at Ardrossan.
Plans and Specifications can be seen, and Schedules of Quantities obtained, at the Office of Andrew Gillespie, Engineer, 65, Bath Street, Glasgow, on and after the 22nd of September, 1902.
Sealed Tenders to be lodged with the Subscriber not later than Twelve Noon on Thursday, the 9th of Oct., 1902.
JAMES COOK,
Town Clerk.
Burgh Chambers, Ardrossan,
Sept. 18, 1902.

BOROUGH OF ROCHDALE.

TO TAR DISTILLERS AND OTHERS.

THE Gas Committee of the above Cor- poration invite TENDERS for the supply of 20,000 gallons of 90 per cent. BENZOL, to be delivered in about equal weekly quantities during a period of Six Months from the 1st of October, 1902.
Forms of Tender and any further Information may be obtained on application to Mr. T. Banbury Ball, the Manager at the Gas-Works, Dane Street.
Tenders, endorsed "Benzol," must be sent in to me not later than noon, on Wednesday, Oct. 8, 1902.
By order,
JAMES LEACH,
Town Clerk.
Town Hall, Rochdale,
Sept. 26, 1902.

BOROUGH OF BURTON-UPON-TRENT.

GAS-WORKS EXTENSIONS.

INCLINED RETORT PLANT.

CONTRACT No. 26.

THE Corporation of Burton-upon-Trent invite TENDERS for the erection and complete equipment of an INCLINED RETORT PLANT and MACHINERY at their Gas-Works, Wetmore Road, Burton-upon-Trent.
Full Particulars and Copies of Conditions and Specification, with Form of Tender, may be obtained on application to the undersigned, to whom Tenders, endorsed "Retorts," are to be delivered on or before Friday, the 28th day of November, 1902.
The Corporation do not bind themselves to accept any Scheme or Tender, nor will they pay any expense or charge relating to the making or delivery of the same.
No Tender will be accepted from any party who pays to his or their employees, whether Artizans or Labourers, less than the Standard Rate of Wages paid for the time being in this Borough, or who does not conform to the Hours and Conditions of Labour generally recognized in each branch of industry affected, and Clauses to ensure compliance with this regulation are inserted in the Conditions of Contract.
F. L. RAMSDEN,
Manager and Engineer.
Gas and Electric Light Works,
Burton-upon-Trent, September, 1902.

ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.
Terms for Issuing such Capital, and also for including Gas and Water Stocks and Shares belonging to Private Owners in these Periodical Sales, can be obtained on application at Mr. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

LOWESTOFT WATER AND GAS COMPANY.

SALE BY AUCTION OF 400 ADDITIONAL ORDINARY £10 SHARES, ranking for 7 per cent., the Dividend on similar Shares in the Company having been 5½ PER CENT. FOR SEVERAL YEARS. Also £1000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MR. ALFRED RICHARDS will SELL the above by AUCTION, at the MART, LONDON, E.C., on TUESDAY, the 21st of OCTOBER, at Two o'clock, in Lots, by Order of the Directors.
The Company, incorporated in 1853, supply Water and Gas in Lowestoft and surrounding District. THE WATER-RENTAL IN 1891 WAS £7146, LAST YEAR IT EXCEEDED £13,500, AND THE GAS CONSUMPTION HAS ADVANCED FROM 43 MILLION CUBIC FEET IN 1891 TO UPWARDS OF 70 MILLIONS in 1901.
New Works to keep pace with the increasing demand for Water and Gas are necessary; and it is for these Works that the New Capital is being raised.
Particulars of Sale, with Form of Instructions for the Auctioneer or Secretary to purchase for Investors unable to attend the Auction, obtainable, post free, of the SECRETARY OF THE COMPANY, 137, London Road, LOWESTOFT, or of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

ILFORD GAS COMPANY.

SALE BY AUCTION OF £5000 "C" STOCK Similar to the Company's existing "C" Capital, which has received 6 PER CENT. DIVIDEND FOR YEARS PAST.
This Company, established in 1839, supplies a large district, which has developed and is developing, perhaps more rapidly than any other London Suburb, the Sales of Gas having increased from 16 million cubic feet in 1890 to over 153 million last year, and the consumers at the present time being nearly 5000.

MR. ALFRED RICHARDS will SELL the above STOCK by AUCTION at the MART, LONDON, E.C., on TUESDAY, OCT. 21, at Two o'clock precisely, in convenient lots, by Order of the Directors.
Particulars of Sale, with Form of Instructions for the Auctioneer or Secretary to purchase for Investors unable to attend the Auction, may be obtained, post free, from the SECRETARY OF THE COMPANY, ILFORD; or of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

SOUTH ESSEX WATER-WORKS COMPANY.

NEW ISSUE OF £2500 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Oct. 21, at Two o'clock precisely, in Lots.
Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

LITTLEHAMPTON GAS COMPANY.

ISSUE OF 400 NEW £5 SHARES.

SPARKS & SON are favoured with In- structions to SELL BY AUCTION, at their Sale-Rooms, No. 25, High Street, Littlehampton, on Tuesday, the 7th of October, 1902, at 3.30 p.m. precisely,
400 £5 SHARES
in the above Company in Lots of Four Shares each.
Full Particulars and Conditions of Sale may be obtained of Mr. W. BELDAM, the Company's Secretary, LITTLEHAMPTON; or at the Offices of the AUCTIONEERS, at LITTLEHAMPTON or ARUNDEL.